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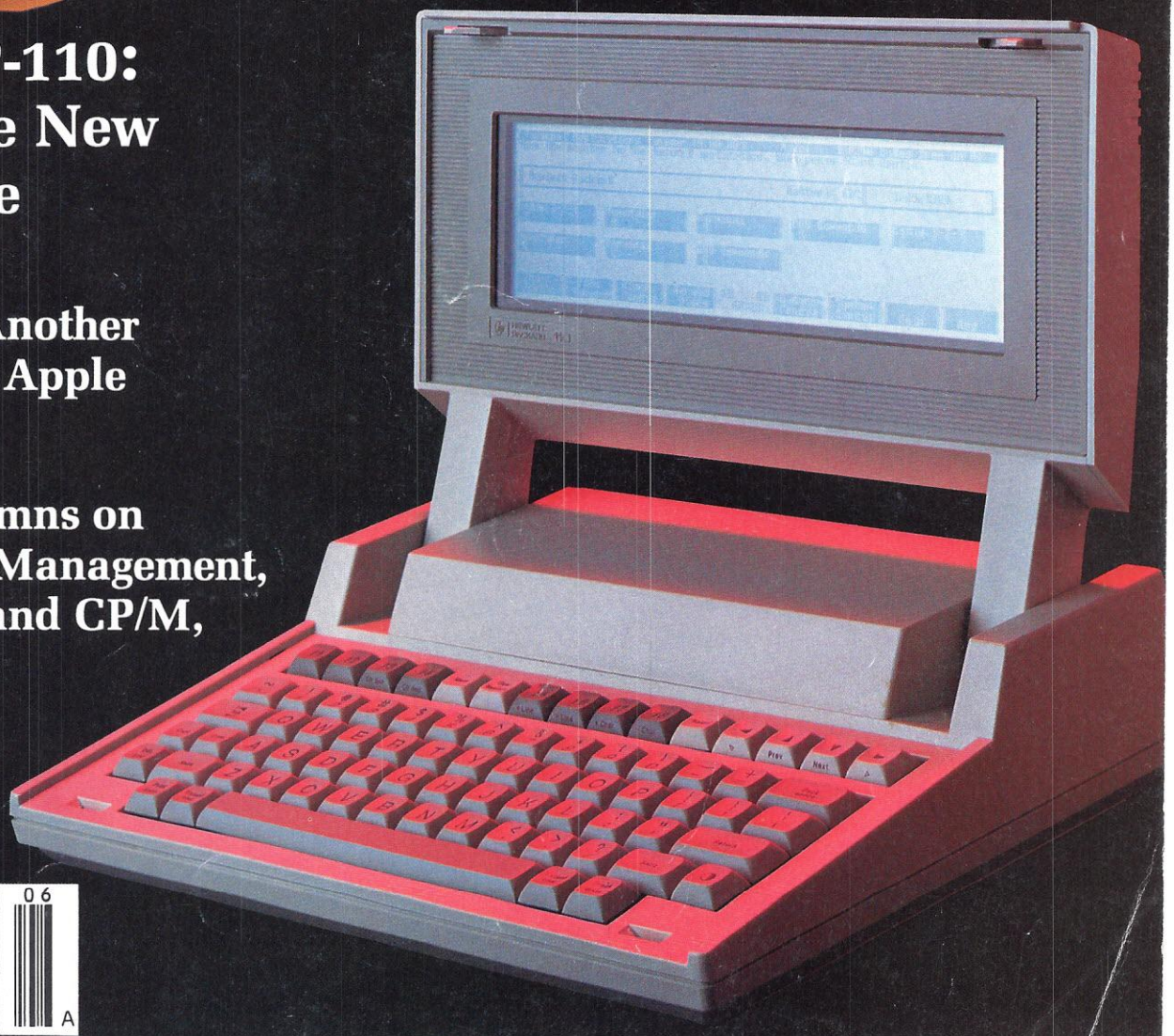
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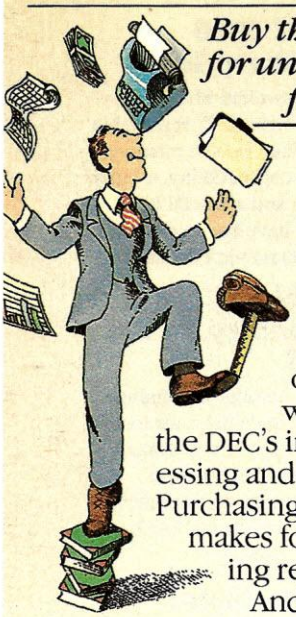
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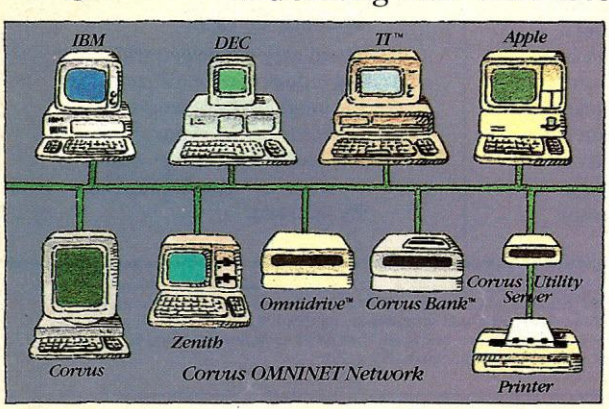


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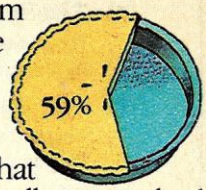
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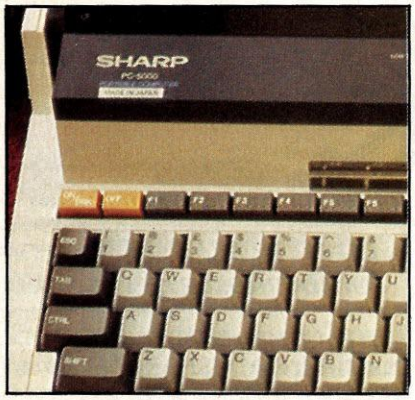
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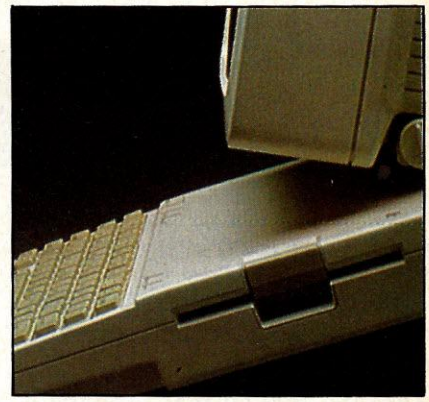
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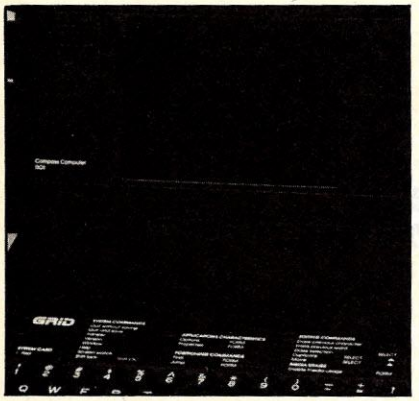
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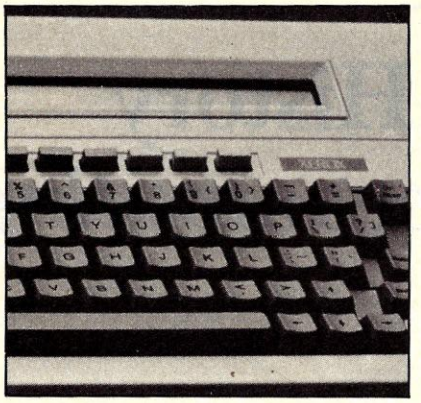
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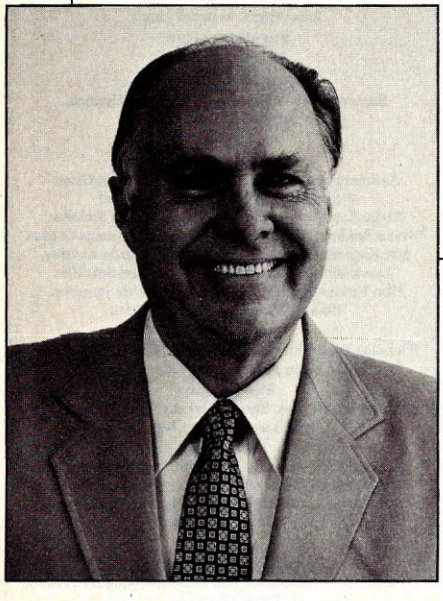
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# Publisher's Remarks

By Wayne Green

# A Brief History of *Microcomputing*

## 1976–1984 Changing With the Times



Nine years ago I got the bright idea that the newly invented microcomputer needed a magazine if it was going to take off as a new industry.

There was only one firm making microcomputers then—Mits, a tiny outfit in Albuquerque. I'd been publishing *73 Magazine*, a magazine for radio amateurs and electronics hobbyists, for 15 years. I noticed that articles in *73* on computers were enormously popular, so why not spin off a microcomputer magazine?

We announced *Kilobaud* at a microcomputer show in Atlantic City in August 1976. We sold more than a thousand subscriptions. The first issue was mailed in November 1976.

*Kilobaud* was aimed at hobbyists. Heck, no one else could cope with microcomputers in those days. They were sold in kit form and a distressing number of them didn't work. The manufacturers' idea was for the hobbyists to finish the designs and then let them know how it was done. This was the way it actually worked.

The Mits Altair 8800, for instance, had several boards that the firm had never been able to make work right. Then, when Imsai came along with its version of the Altair, some of its boards didn't work either. And so it went.

### PET Peeves

The first microcomputer that was all in one package was the Commodore PET. This was first shown in the spring of 1977 at the West Coast Computer Faire. It had a terrible keyboard, promptly copied by Sharp in Japan. This was the first micro that you could buy, plug in and turn on.

Radio Shack jumped in and made hay with its TRS-80, which was released in August 1977. With this system being sold through thousands of Radio Shack stores, it was no longer necessary to be an electronic hobbyist in order to cope with a computer.

### The First Apple

Apple made its debut at that first Atlantic City show along with *Kilobaud*. In fact, Steve Jobs was right across the aisle from my booth showing his Apple I. He was tickled that he'd gotten orders from dealers for 20 units and felt that the trip had been worthwhile.

By 1978, Radio Shack had taken a heavy lead in sales. Apple and dozens of small computer manufacturers, such as Imsai, Processor Tech, Polymorphic Systems and Southwest Tech, were just getting going.

By 1979, TRS-80 articles inundated *Kilobaud*, so I came up with the idea of spinning off a magazine just for the TRS-80. No one had ever heard of a system-specific magazine. They said it would never sell. I said it would, and the first issue of *80 Microcomputing* came out in late 1979.

By the end of 1980, *80 Micro* had grown from 132 pages to more than 400. This spin-off slowed the circulation growth of *Kilobaud*, which reached more than 100,000 paid readers. By this time, I could see that the whole industry was following the lead of Commodore, Radio

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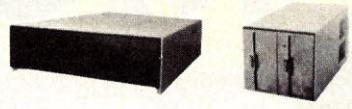
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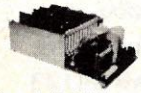
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## Publisher's Remarks

Shack and Apple. Computers were now being bought to be used, not just as a hobby. It was time to change the thrust of *Kilobaud* to follow this change in the growth of the industry.

A few months later, I changed the name from *Kilobaud* to *Microcomputing*—better reflecting the new concept. It was less of a hobbyist name and the articles were gradually made less technical—aimed now at the new computer hobbyist who was more interested in using his computer than building it.

As the Apple continued to grow, we spun off *inCider*. This also drew readers from *Microcomputing*, holding its circulation steady. To try and thin *80 Micro* a bit we spun off *HOT CoCo* for the TRS-80 Color Computer. Then we started *RUN* for the Commodore VIC-20 and C-64 computers—and still *Microcomputing* survived the spin-offs, hanging in there at 100,000!

But by this time, the whole market had changed again. Now the concept of the system-specific magazine was solidly accepted. The first reader rush to drop the general micro magazines and get just a specific one changed to getting both types of magazines. Also, as millions of people became involved with microcomputers, the number of readers wanting more than just the usual overview increased—with more and more readers turning to *Microcomputing* for this information.

It's been fun watching my first microcomputer magazine spawn dozens and then eventually hundreds, with new magazines turning up every few days . . . and others failing at about the same rate. Oddly enough, despite the failures, there are still some viable niches in the micro field that really would be helped greatly if new magazines were to be started for them.

### The More Things Change . . .

This is an entirely new *Microcomputing*, yet it is the old *Kilobaud*, living on to help make microcomputers more fun. Keep an eye on my magazine—our magazine—and don't ever forget that I want to hear from you—good or bad.□

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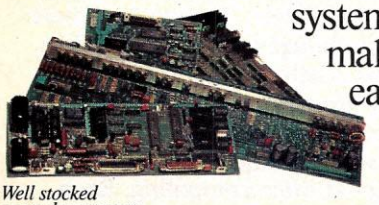
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# The Edit Mode

## A New Era Is Born

### *Microcomputing* Stands Out From the Crowd

This issue of *Microcomputing* marks the beginning of a new era for a pioneer in the microcomputing magazine field. This month is a re-christening for *Microcomputing*. We reaffirm our original intent as a practical journal for microcomputer users.

There are now more than 300 periodicals in the United States that are devoted to microcomputers—some are esoteric; many are of general interest. It is often difficult to tell one from another.

*Microcomputing* will be markedly different from these lookalike magazines in a number of ways. First, while we welcome all micro users as readers, our treatment of topics will be more technical than most magazines. We intend to write for the micro user who already has a grasp of the fundamentals of computing.

Second, we will emphasize the practical side of microcomputing. We won't dwell on the more cerebral, theoretical aspects of computers. Instead, we'll provide you with better ways to get the most from your computer. We'll offer tips on programming and hints on how to squeeze every feature from an application program. We hope to make *Microcomputing* stimulating reading that will expand and sometimes challenge your knowledge.

> We herald our rebirth with an entirely new design and layout for *Microcomputing*

Our reviews, reports and articles will be technically oriented. We'll be as objective as possible by reporting facts and presenting material in an understandable fashion. Whenever possible we'll provide comparative charts and benchmarks so that you can draw your own conclusions about the products we present.

Take a few moments to scan our table of contents. Among other things, you'll find new columns that we think will interest you—columns about aspects of computing that are relevant but aren't limited to any particular computer system.

*Microcomputing* is not intended to be a system-specific magazine. We'll report on what we perceive to be significant machines or products. We hope to increase your knowledge of new developments and ideas across the entire microcomputing field. We expect that you will learn of new technological advances within the pages of this magazine. We'll send our editors around the country to report—firsthand—on innovative products. For example, our cover story this month features a comprehensive look at the HP-110, released just last month. Also, we have a preview of the new Apple IIc introduced at the end of April. We'll be aggressive in our coverage of new products in the field.

Readers have always played an important role in *Microcomputing*. From our very first issue we have encouraged you to write articles, reviews and letters. This commitment has not changed. If you're a writer, send us a letter with your article or review ideas. We invite you to write us with comments about what you think we're doing right—and wrong—at *Microcomputing*. Each letter is read and considered carefully.

For our part, we have assembled a knowledgeable staff here in Peterborough. We're interested in microcomputer users who revel over what is happening within the business. We actively solicit material for our pages that we ourselves are excited about—we like nothing better than to share our discoveries with you.

Finally, we herald our rebirth with an entirely new design and layout for *Microcomputing*. It reflects graphically what we have dedicated ourselves to produce—a practical journal of advanced computing.

I look forward to our time together. Please let me know what you think of our efforts.

K.T.

---

*Nothing great was ever achieved without enthusiasm—Emerson*

## Sneak Previews

In July, *Microcomputing* continues to bring you information on the latest advances in the field.

You've read our preview of the just-released Apple IIc. Well, in July, we review the system in detail.

VisiOn has finally arrived! You've heard about it, read about it and wondered about it. Tom Bonoma reviews this highly publicized product in our next issue and tells you whether VisiOn is a bargain or money out the window.

What can you say about the PCjr that hasn't already been said? In July, Ken Sheldon has a lot to say. He'll answer the questions and address the speculation that has surrounded the introduction of Junior (or Baby Blue, if you will).

Discouragd by the nasty March weather here at our Peterborough, NH, offices, Senior Writer Eric Grevstad packed up pen and paper and headed to sunny Toronto for a story on Telidon and the NAPLPS (North American Presentation-Level Protocol) graphics language. Next month, Eric reports his findings.

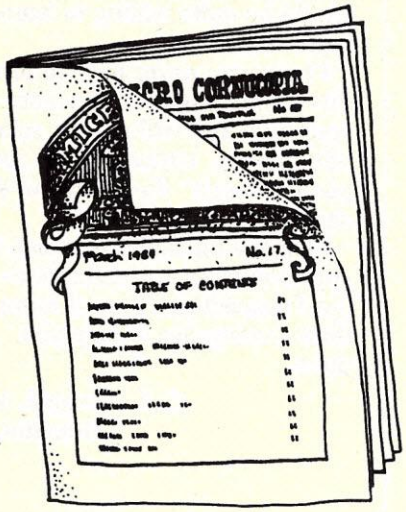
Also in July, Shawn Bryan's epic on database management systems continues with reviews of dBase II, Condor III and Data Base Manager II.

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# Micro Cornucopia

**Rave reviews have exposed Micro Cornucopia as the Single Board Systems Journal with style.**

*"My personal favorite periodical is Micro Cornucopia. Editor and publisher David Thompson can convey an idea — no matter how complicated or technical — in a way that is not only understandable but seasoned with humor . . ." A. William Everly, President of TBAKUG.*




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# Letters

### Bull Manure?

I admire Wayne Green because he writes what he thinks, not what others want him to write. When Wayne talks about the computer business, he's usually right. But Wayne's editorial in the April *Microcomputing* is the biggest pile of bull manure I have ever read!

First of all, Wayne said that flashing subliminal messages on on TV screen might cure cancer. Come on, Wayne, you don't really believe that! Unfortunately, some people dying of cancer who read your editorial will believe it. I only hope that this false hope for survival won't keep any cancer patients from getting proper medical care.

Secondly, Wayne says that doctors and hospitals don't want to cure cancer because they would make less money. I am a doctor, and I think I speak for the entire medical community in responding to this charge. Wayne, you stink!

I can't begin to describe the agony that a doctor goes through when he has to watch his patient die and can't do anything about it. I'll always remember that ten-year-old boy with the brain tumor. I played with him every day for four weeks while his head swelled out more and more to one side. I pumped on his chest when his heart stopped, knowing it wouldn't do any good. I told his mother he was dead. And then I cried like a baby. If I could have saved that boy by putting on warpaint and a loincloth and chanting voodoo, believe me, I would have done it!

Above all, doctors are motivated by a compulsive need to do what they think is morally right. Doctors don't cause suffering and death to make more money for a simple reason: It's wrong!

Magazine publishing is the only business I know of where you can make more money by being wrong than by being right. Wayne, you say some crazy things, but it sure makes interesting reading!

**Bill Basham, M.D.**
**Rockford, IL**

---

### Green's Statements Ridiculous

Wayne, until your recent editorial outrage, April 1984, I have never been prompted to write to a magazine.

Even if you believe the ridiculous statements you wrote, I can't believe you would publish them. While it would be equally ridiculous of me to assume there weren't bad doctors (along with bad lawyers, bankers and magazine publishers), fortunately for everyone concerned, these bad apples are in a minority. The vast majority of M.D.'s are honest, decent, caring human beings who would rather spend their days preventing than curing cancers. Most oncologists that I know would be quite willing to learn a new "trade."

I hope you never have to test this "technology" on a cancer of your own and will rely on scientific therapy. Unfortunately, few people "laugh" their way out of cancer.

I'll leave the ladies to speak to your comments on seduction—but I suspect you'll need more than a computer to help you there.

**C.A. Kaeppel, M.D.**
**Houston, TX**

---

### A Simple Solution

It would seem that there is a simple and obvious solution to Mr. Green's mind-control worries, brought out in his April "Publisher's Remarks." One simply programs the Expando-Vision unit to flash "Ignore all other subliminal messages." Problem solved.

An even better solution would be to use the television only for a computer video display, thus making it impossible for subliminal messages to be transmitted to you. Boy, do I have a yen for a 256KB expansion card!

**Andy Hill**
**Sherman, TX**

---

### Error in the Co-op

I have received some calls concerning my article "Apple and Food Co-ops," which appeared in the November 1983 *Microcomputing*. It appears that there is one error in the program: line 700 should read

```
FOR BB=1 TO 5: PRINT CHR$(7);: NEXT
: RETURN
```

The original line has B instead of BB, and the semicolon after CHR$(7) has been added.

It has actually been almost two years since that version was written, and I have put in many improvements. Item entry is easier, allowing all the estimated price information, if desired, to be entered at the same time as the item name and unit. The minimum order amount is now saved to keep track of how many cases of each item can be ordered. Items can be switched if, for instance, we can order only one kind of lettuce when there were two kinds on the order sheet. I also have a form of the program broken into input and output to allow for larger item lists and more members.

I am now adapting the program for use with the Apple III, where I find the 80 columns and Business Basic combine to make a much nicer-looking program.

I would be happy to send a copy of either of these programs, or a listing of the latest version, to readers for a cost of $15. I would, at any rate, be happy to hear from readers who have made use of the program, whether on an Apple or on other computers.

**Tobi Hoffman**
**58 Hilldale Road**
**Ashland, MA 01721**

---

**Good Review, But...**

First, I must thank you sincerely for the review of our invoicing/AR software package, Diskinvoice System, which appeared in the April, 1984 issue of *Microcomputing*. As I'm sure you know, publicity—particularly a positive review in such a venerable and well-respected magazine as yours—is essential for a new product to be successful. Please express our thanks to writer Greg Glau for his many kind words.

I would like to point out that, because of the necessities of magazine scheduling and lead times, the version of Diskinvoice System that Mr. Glau reviewed is nearly six months out of date. Normally, this wouldn't cause any difficulty, but Broadway Software has a rather unique company policy. Like any user who's a hacker at heart, we continually upgrade and improve our software packages. Thus, all of the weaknesses Mr. Glau mentioned in his review have been eliminated.

The package has been thoroughly error-proofed, line extensions are now done automatically, customer info is now quickly and easily displayed for review and changes, the statement/report generation procedure has been completely rewritten to be easier, faster and give even more useful information, and the instruction/documentation booklet is now more than 40 pages of solidly written, easy to understand information. I especially want to emphasize that, even though the package has been greatly improved and now has a genuine big-budget feel, it still sells at $55.

Greg Glau's review of the version of Diskinvoice System that he had was excellent. His comments were completely on target, and we have learned to appreciate his concise, informative, and thorough style. We look forward to seeing his work regularly in *Microcomputing*, even when he's not reviewing one of our products.

Please note our new address. Thank you again for the fine review.

**Wendell Craig, President**
**Broadway Sofware**
**660 Amsterdam Ave., Suite 136**
**New York, NY 10025**
**Source TCM014**

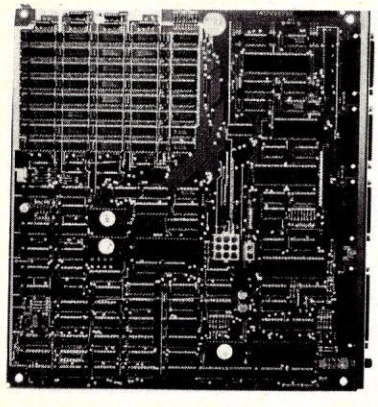
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# Techniques

By Mark Robillard

# Remote Ruminations

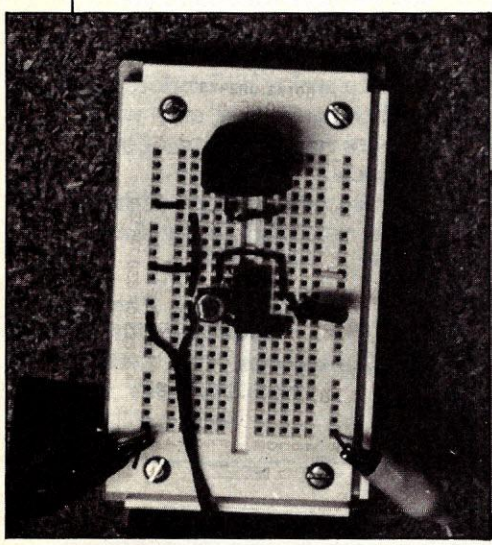


Photo 1. Prototype of Fig. 1's remote transmitter.

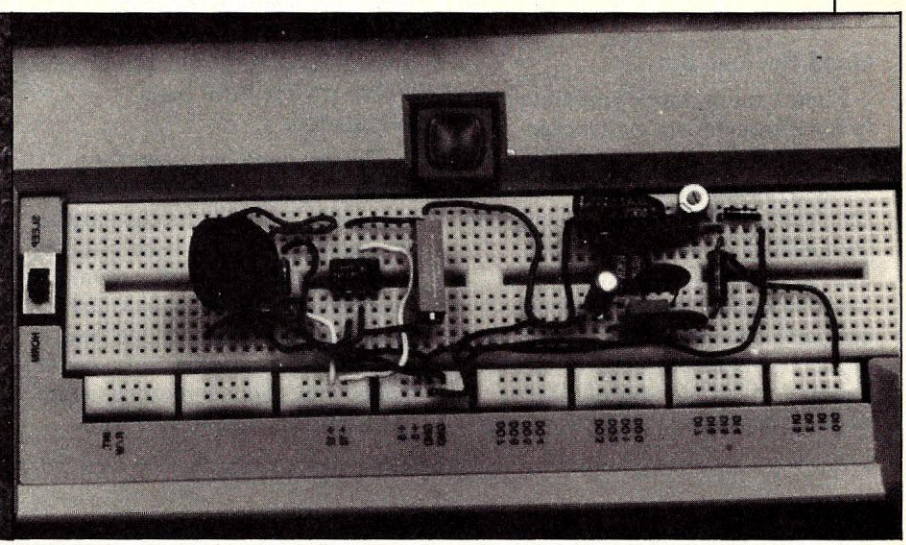


Photo 2. Prototype of the remote receiver circuit of Fig. 2 implemented on Hero's breadboard.

## Amazing

Few things are as fantastic as seeing a piece of machinery react to your command when there's no apparent connection between it and you. Touching a button on a TV remote controller in a store and instantly retuning two dozen sets gives you a feeling of immense power. So, too, does the remote command of intelligent machines.

This month you'll be introduced to various methods of remote control. These methods specifically apply to two commercially available robot systems. They may, however, be applied to other microprocessor- or computer-based equipment. By remote control, I don't mean mere on and off control. The emphasis is on intelligent communication between you and a machine.

### Cut the Cord

The three most popular ways of remotely controlling a machine without the use of wires are: infrared light, ultrasonic and radio transmission. Infrared is a common means of remotely controlling today's appliances. Ultrasonic control involves the use of high-frequency sounds (so high you can't even hear them). The last, radio, is familiar to all.

You've probably heard all this before. No doubt, you've considered giving your machine the ability to slip away without an umbilical cord. Perhaps you've decided to provide on-board computer control. So what's this column got for you?

Well, I think I've managed to gather a little something for everybody here. I'll present two complete remote command systems. The first utilizes ultrasonics to effect a 300 bit per second (bps) serial communication link. The second communicates with radio, providing a four-bit code that is used to transfer data. But before I get into the systems, let's view the components.

### Remote On/Off

You've got to start somewhere, right? The first component that I'll examine is the remote transmitter—the device that delivers your command to the robot. In the case of the infrared and ultrasonic versions, this may be the same circuit.

Let's define what you want. First, you want range. After all, what good is remote control if it isn't remote? The next important item is information. What kind of information activates the other side? In the case of an on/off system, it may simply be a tone of a precise frequency.

So far, you have a long range beeper. Add small size and battery operation and you have a plausible system. Fig. 1 shows a complete schematic of a transmitter that will, when powered, emit a 40 kHz tone that oscillates either the ultrasonic

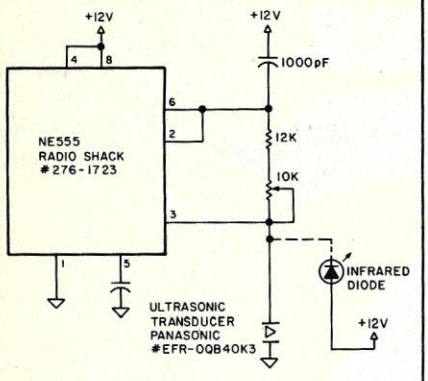



*Fig. 1. Remote control transmitter circuit.*

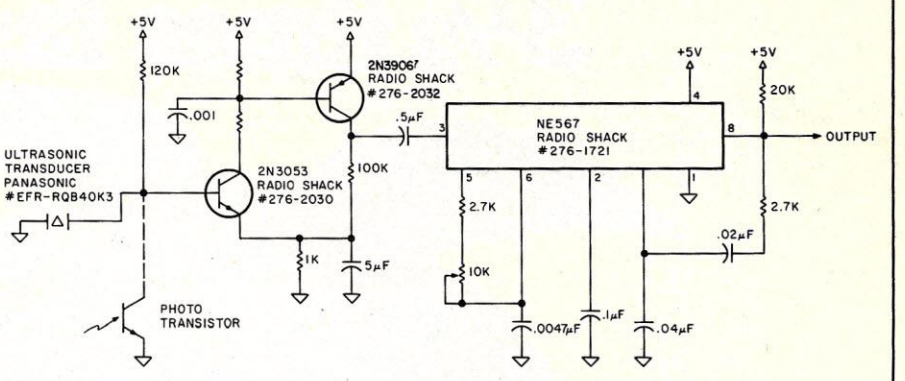



*Fig. 2. Remote control receiver circuit.*

transducer or an infrared LED. Tuning the potentiometer in the circuit varies the frequency. However, the ultrasonic transducer is tuned to only 40 kHz. The circuit shown has a working range of approximately 20 feet.

Looking at Fig. 1, you see that the infrared diode, or the transducer, is basically driven at the transmission frequency by an astable multivibrator made up of a simple 555 timer. The circuit, as it's configured, runs as long as power is applied. Pin 4, which is connected to the supply voltage, can be used to remotely turn on and off the transmitter or as a keying circuit for sending serial ons and offs to a remote receiver. The frequency-determining elements of the circuit are the potentiometer, the fixed resistor and the 1000pf capacitor. As you can see, a remote transmitter isn't very complicated.

The receiving end is really not much more of a challenge. Fig. 2 shows one way to amplify the signal being received. This approach uses a two transistor circuit that amplifies the signal and presents it to a tone decoder IC. This IC (NE567) is tuned to detect the 40 kHz signal.

An alternative amplifier circuit is shown in Fig. 3. Here, a simple 741 op amp is substituted for the two transistor discrete circuit in Fig. 2.

Using the circuits in Figs. 1 and 2, you can transmit a control signal the length of a room. Today's TV remote control equipment uses custom designed integrated circuits to act as the transmitter and receiver. Most of these circuits are available now as standard products. They range from simple on/off controllers to sophisticated multichannel control units that have the capability to

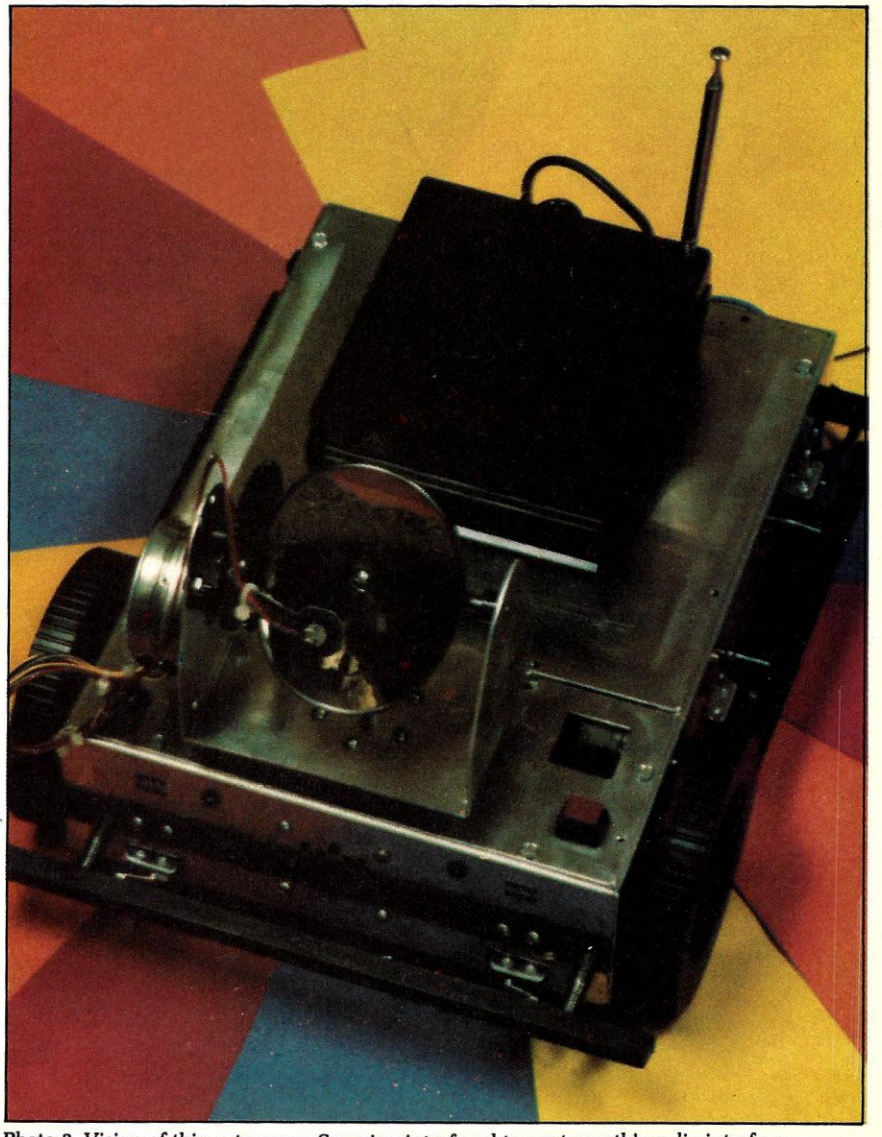


*Photo 3. Vision of things to come. Scorpion interfaced to next month's radio interface.*

# How to make your Apple run 3½ times faster.



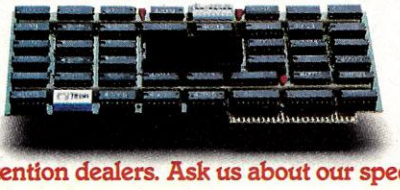
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I've experimented with many different types of control mechanisms—infrared systems are tough to duplicate.

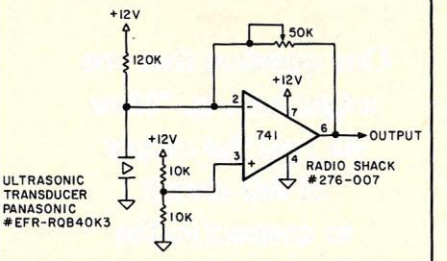



*Fig. 3. Optional integrated amplifier for Fig. 2.*

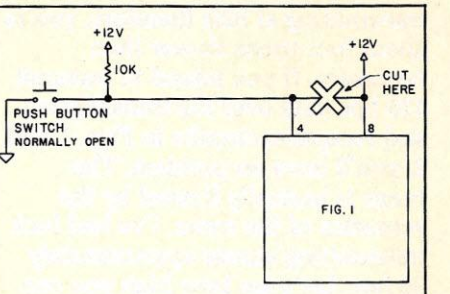



*Fig. 4. Manual control of transmitter of Fig. 1.*

output analog control signals. I'll investigate one specific remote control integrated circuit pair next month. However, let's go back to some simple circuits and adapt them to our specific needs.

**Ultrasonics**

I'd like to discuss the ultrasonic operation of the circuits in Figs. 1 and 2. During the past months, I've experimented with many different types of remote control mechanisms. I've had tremendous difficulty in getting infrared systems to work reliably. I find that, without tremendous filtering or optical lens techniques, infrared systems are tough for the hobbyist to duplicate. Ultrasonic systems, however, are simple. The biggest problem in ultrasonic work is finding a good source for the transducers. At the end of this article, I'll list a good source where you can obtain these devices.

So now, assuming that Fig. 1's circuit is connected to an ultrasonic transducer, high frequency sound is pulsing out of the transmitter as long as power is supplied. The circuit in Fig. 2, when connected to its transducer, must be tuned to the 40 kHz signal. This tuning process is relatively simple. The NE567 tone decoder is a phase-locked loop that looks for a certain frequency period and locks on it. The frequency period that it searches for is determined by the potentiometer shown in the circuit and the value of the .0047μF capacitor. By tuning this variable resistor with the transmitter operating, you can lock onto the 40 kHz signal. You'll be successfully locked on when pin 8 of the NE567 falls to a logic low level. At this point, you have a remote transmitter/receiver system.

The system described allows on/off control. As you know from last month's column, the Scorpion robot requires a serial RS-232C signal. Serial implies many on/off transitions. As I mentioned earlier, by utilizing the control pin (pin 4) of the 555 timer, you can effect a remote on/off control for the transmitter. By remote, I mean a signal applied from another control circuit. A logic one or a logic zero either enables or disables the transmitter.

**Try It**

The first experiment that you might try is to hook up this pin to a push-button switch. When the push button is on, or closed, it should connect pin 4 to ground. When it is off, or open, it should connect pin 4 through a 10k resistor to +12V, as shown in Fig. 4. Now, every time you push the button, the transmitter goes off. You can check this by observing the voltage at pin 8 of the NE567 in the receiver. When you push the button, this voltage should become a logic one. In fact, pushing the button rapidly causes this output to appear to be pulsing at a rather quick rate.

What do I mean by "rather quick"? Well, unfortunately, your finger can't duplicate normal serial transmission speeds. Serial transmission, or the standard UART output, typically ranges from 50 bps all the way up to 19,200 bps. By bits, I'm implying that an eight-bit signal is being transmitted from the UART with one start bit, possibly one stop bit and maybe even a parity bit in between.

For the purposes of this discussion, let's assume the following: The standard serial output should be one start bit, eight data bits and one stop bit with even parity. That adds up to 11 particular points in the time that the output is a one or a zero. Each character consists of those 11 on/off transitions. Therefore, the output of the transmitter pulses (or has the capability of pulsing) 11 times per character. In the case of the old standby 110 bps rate that the teletype users implemented, the time period that those 11 bits take is approximately nine milliseconds (ms).

If you divide nine ms by 11 bits, you get about 820 microseconds (μs) per bit. In today's world of high-speed microprocessors, 800 μs is fairly long. In fact, 800 μs has always been long in microprocessor systems. However, realize that the transducer in this circuit is oscillating at 40 kHz. This rate translates to an on/off cycle period of about 25 μs. If you were to transmit on and off digital logic signals through the use of this transmitter, each bit period would last 820 μs. Given that your transmitter is oscillating at a period of 25 μs, you then get 32 oscillations at your frequency.

**Wondering**

At this point, you're probably wondering if this has anything to do with transmission of digital data. It turns out that the specifications for the NE567 tone decoder show that it doesn't lock on to a signal properly, or that it doesn't detect that frequency, unless there are at least ten cycles of that frequency present. Therefore, the fastest you can transmit is, at a minimum, 250 μs. You're

transmitting at 820; therefore, you're about four times slower than necessary. If you intend to transmit 110 bps data over the transmission and reception circuits in Figs. 1 and 2, you'll have no problem. The range is basically limited by the acoustics of the room. I've had luck transmitting across approximately 20 feet. Let's see how high you can go.

Remember that the transmitter is oscillating at a 25μs rate and that the receiver needs a minimum of ten cycles to lock on. Obviously, cutting it to ten won't give enough flexibility to deal with the circuit temperature or component drift. So let's make it 15.

If you multiply the 15 cycles that you need times the 25 μs period, you end up with a maximum period of 375 μs. All you have to do is translate this maximum period into the bit rate that it supports. This is done by multiplying the 375 μs figure times the 11 bits that are transmitted. You end up with a 4.125 ms character time. Dividing this into one realizes a 242.4 bit rate.

Obviously, 242.4 bps isn't an industry standard. The closest you can come to that would be 300 bps. Investigating further, 300 bps requires approximately 300 μs bit times. This is accomplished by allowing only 11 cycles per bit. At that rate, you'll be down around 275 μs per bit and the 300 bps rating will work.

Take a look at Fig. 5. Shown here is an RS-232C receiver chip, the MC1489, which can be purchased at any Radio Shack store. The part number is right on the schematic. This circuit translates the plus and minus voltage levels of the RS-232C standard into standard TTL logic signals. These signals are high enough to trigger the pin 4 gate input, which is then applied to the control input of the 555. The RS-232C end of this circuit is connected to a standard 300 bps serial output from your computer. If all goes well, and if it's wired correctly, you are transmitting at 300 bps. Looking back at the receiver, if you attach a scope to pin 8 of the NE567, you'll receive a fair representation of the signal. It may take some more tuning to get it locked in properly; however, I have no problems running at 300 bps.

> One question that you might have is, "How do I get the output of this circuit to connect to the Scorpion input?"

### On to Output

Well, there you have system number one. Might be a little simpler than you were expecting, but it's indeed a remote transmission/reception system. One question that you might have (if you read last month's column) is: How do I get the output of this circuit to directly connect to the Scorpion input? Well, here's where you have a little problem. Not only is the output of this circuit a standard TTL level, but it's also not the correct bit rate for the Scorpion. If you'll recall, Scorpion was designed to accept a 9600 bps serial input. It's obvious, using a 40 kHz transmitter, that you can't effect 9600 bps over the ultrasonic air waves. You can adjust your circuit and your method of transmission in a couple of ways to help alleviate these problems.

I'm not condoning the first way I present, although it works. Fig. 6 is a schematic of a serial-to-serial converter. Basically, what you have is a UART where the bit rates differ from the transmitter to the receiver. In between is some control logic that buffers the two. As you can see, the 300 bps signals coming into the receiver are transmitted at 9600 bps. In this direction, the control logic necessary is minimal. In the other direction, it becomes horrendous, mainly because 9600 bps is much faster than 300 and you'll receive characters like crazy. Another method, which I'll present, changes the operating parameters stored for communication with Scorpion. But before I get into that, I'd like to fulfill a promise that I made last month regarding the Hero robot.

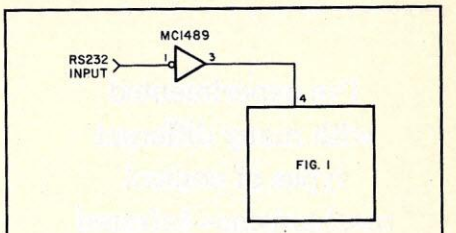



*Fig. 5. Interface with RS-232C.*

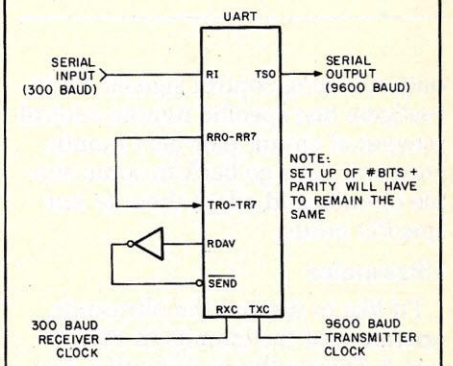



*Fig. 6. Functional diagram of a serial-to-serial bit rate converter.*

### Fulfilled

Last month, I stated that I'd show serial transmission systems for both robots. Hero can receive serial transmission at any bit rate. I'll show you how to hook up the circuits in Figs. 1 and 2 to a Hero to transmit program and control data. Photo 1 is a picture of the completed transmitter circuit implemented on a standard solderless experimental breadboard. You'll notice the absence of any level shifting circuitry in this photo. The reason is that I interfaced it with a standard TTL output serial link. However, if you intend to use it with a standard RS-232C system, you must put in the level shifting circuitry shown back in Fig. 5.

Now let's hook up a receiver to the Hero-1 robot. Following the schematic in Fig. 2, use the solderless breadboard built into the head of Hero. Photo 2 shows the completed circuit. The black object at the right-hand side of the breadboard is the ultrasonic transducer.

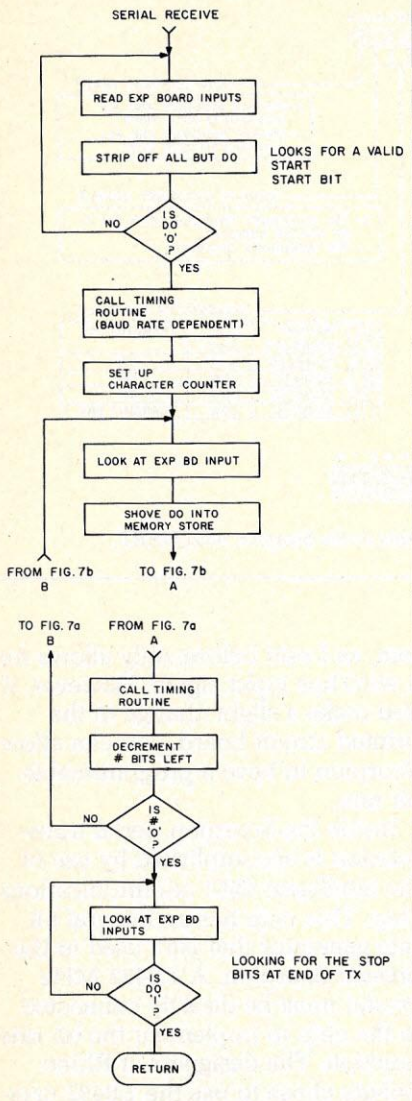



*Fig. 7. Flow chart of Hero receive program.*

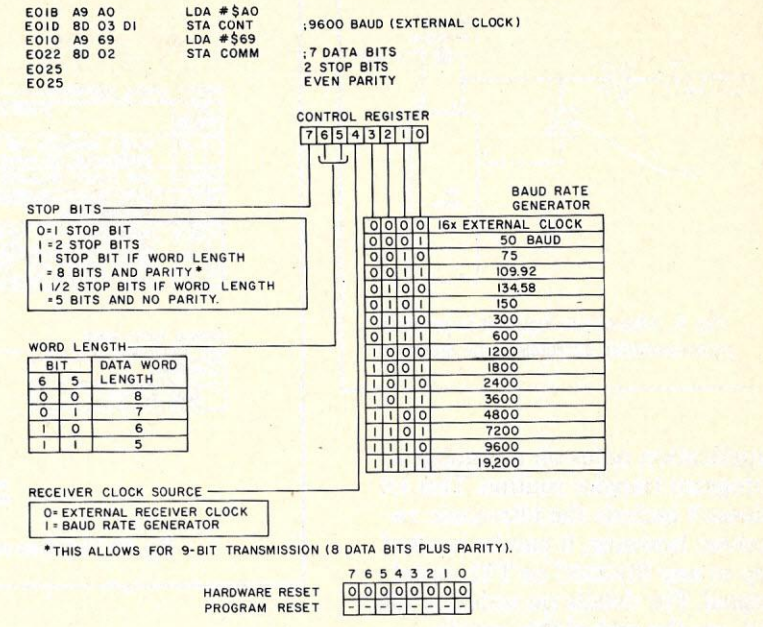



*Fig. 8. Portion of Scorpion operating system dealing with the 6551 UART with reference to the control register bit assignments.*

In Photo 1, the same black object is shown on that breadboard. The transducers that I chose are made by Panasonic and are relatively modular in construction. They have standard component legs that allow you to mount them into a board. You can also use other types of ultrasonic transducers.

In Photo 2, you see two potentiometers in the circuit. The one in the center of the photo adjusts the gain of the amplifier. This amplifier, in a solderless breadboard, tends to oscillate. Be careful of the way you route the grounding wires.

The other potentiometer adjusts the frequency. You should adjust this frequency with no signal applied first, using a frequency counter attached to pin 5 of the NE567. Then adjust the transmitter's frequency accordingly, by attaching a frequency counter to pin 3 of the NE555 and adjusting the 10k pot. When you have both at the approximate frequency, turn them both on and aim them within a straight line. It's very probable that the receiver output will oscillate, which shows that the two are close but not exactly locked. At this time, adjust the receiver's frequency pot until the output locks a steady low. You might also adjust the transmitter frequency. From here, you have a fairly solid ultrasonic transmission link.

You still haven't shipped any data through this link. The output of the NE567 is connected directly into the data input line (DIO) of Hero's experimenter board. In order to receive serial transmission into the Hero circuitry through this line, you must design a software routine that periodically samples this input searching for a start bit. When the routine finds the start bit, it calls a timing routine that is bit rate dependent. This timing routine is set with a certain period to determine whether it's a valid bit time or not. In the event the bit time is correct, the timing routine then sets up a character counter that looks for the eight bits. From here, the routine samples the input bit, once again looking for the first character bit. You can follow the flow of this program by looking at Fig. 7.

As you can see by the remainder of the figure, each time a bit time comes around, the input is sampled and the state of the sample is sent into a memory location. The character is built one bit at a time and shifted into a holding memory location.

After all eight bits have been received, the routine then looks for the stop bit, which will be a logic one. At that point, it then falls out. What I've just described is a single character serial receive routine. This single character routine can be included in a program that calls this routine each time it wants one character. Complete data transfer programs may be designed using this routine. For those of you with a Hero robot, I've made a complete kit available, consisting of the serial receive routine already stored on a Hero-compatible cassette, the RS-232C translator IC and the series of

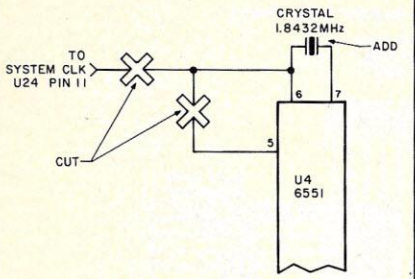



*Fig. 9. Alterations required to provide programmable bit rates to the Scorpion.*

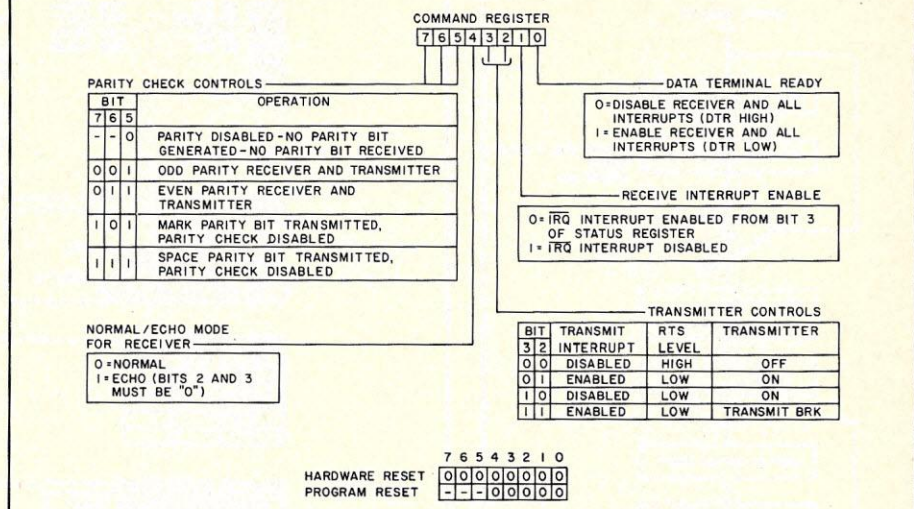



*Fig. 10. Common register bit assignments in the Scorpion 6551 UART.*

application notes on designing a program transfer routine. This kit doesn't include the ultrasonic receiver; however, it can be hooked up to any RS-232C or TTL serial signal. For details on ordering the kit, see the end of this article.

### Scorpion

You can use the same serial receive routine philosophy with the Scorpion. A program may be designed in the 6502 language of the Scorpion that is similar to the 6800 version. The Scorpion operating system, as I said before, only allows for a 9600 bps input signal. However, if you make a slight change to the printed circuit board, you can allow Scorpion to have a programmable bit rate.

Inside the Scorpion, serial transmission is accomplished by use of the intelligent 6551 communications chip. This chip has an integral bit rate generator that isn't used in the present Scorpion. A 1.8432 MHz crystal must be directly connected to the chip to implement the bit rate function. The designers at Rhino Robots chose to use the 1.8432 crystal as the system clock and, therefore, have connected it as an external clock input. However, by changing the coding on the Scorpion operating system ROM, you can select any bit rate you wish.

There are a couple of ways to do this. The first is to change one memory location to select whatever bit rate you like. The second is a little more complex and requires reading a dip switch to find out which bit rate to select.

Let's go into the first method mentioned in this column. Those of you who are curious as to how to perform the latter, drop me a line and I'll be happy to send you the details. Be sure to include a self-addressed stamped envelope, please.

Fig. 8 shows the code within the Scorpion operating system that provides the setup for the 6551. The

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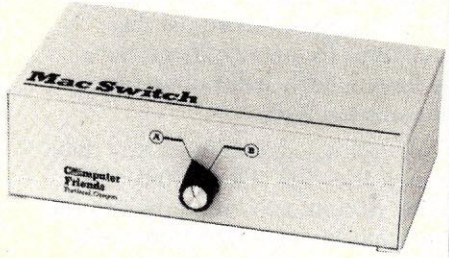
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first place in the code that you should be concerned with is A01B, a Load Immediate of a control register value A0. As you can see at the bottom of the figure, the control register bit assignments are outlined. Projecting the A0 number into these bit assignments, you can see that the zero portion of the code activates the 16x external clock input. The A portion signifies two stop bits and a word length of seven bits. In order to provide a different bit rate, you must use the internal bit rate generator—the last four bits of this register become the bit rate select. To do this, as I said earlier, requires a small change to the circuit card. I've decided to provide a separate crystal for the bit rate generator. The 6551 is designed to work in an asynchronous environment and, therefore, the two crystals used in the system won't affect its operation. This requires purchasing another 1.8432 MHz crystal. A source of supply is shown at the end of this article.

Fig. 9 shows the necessary alterations required on the Scorpion circuit for this modification for communication (which is much more flexible than the original design). The table, shown back in Fig. 8 for the bit rates, gives you an idea of how to set up the control register. That requires you to take out the EPROM, which contains the operating system in the Scorpion robot, and change location E01C to whatever you desire. Parity selection is changed by altering the location at E021. Fig. 10 shows the bit assignments of the command register that must be altered to change any parity status.

So, with just the alteration of those two locations and the slight modification to the circuit board, the addition of a crystal and some wires, you now have a simple programmable bit rate generator.

## Conclusion

So far, I've shown you a smattering of remote control circuitry. Why do I say smattering? Because you're not done yet. So far I've gone over the ultrasonic possibilities in communicating with a Hero and with a Scorpion. You've done some slight modifications to the Scorpion to allow you to receive serial information.

Next month, I'll present a radio-controlled remote communications system. After experimenting with the ultrasonic system, you'll notice that it's highly directional. Unfortunately, when you have movable robots or machines that might be placed in out-of-the-way locations, ultrasonic or infrared systems tend to degrade. Radio, on the other hand, normally goes through walls as long as too much steel isn't embedded in them. Next month I'll present a complete radio command system that interfaces to both the Scorpion and the Hero.

As usual, you'll be able to utilize these circuits with any type of machine to which you want to communicate. Photo 3 is a completed Scorpion with radio interface connected. I look forward to presenting that next month and hope you'll join me then.□

*Mark Robillard is an independent consultant. You may contact him at MJR Digital, PO Box 630, Townsend, MA 01469.*

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# Overview

By Frank Derfler

# Taking a High Perch

## Twists and Turns in The Micro World

### Overview

It's my pleasure this month to start out by giving you an overview of "Overview." This column is a little different every time, but I try to strike two major themes and several notes in every issue. First, I try to tell you what practical hardware and software products are on the market and what I think will work for you "as advertised." I try many different programs and pieces of hardware, and I enjoy telling you about the good ones. This microcomputer industry has three kinds of products: announced products, demonstration products and real products. Often it's hard to tell which is which. I try to help.

Secondly, I take a high perch over the industry and spot the trends and developments that might interest you. I do this both because I know you enjoy the marketing twists and turns in this fast-moving industry and because many of you buy software and equipment and want to be sure you're making the right decisions. I've had good fun and success in the last five years predicting how new software and hardware products will affect each other and combine to create even more new products.

### Minor Notes

I also have fun with some of the minor notes I hit from time to time. The words "If you want to get rich. . ." have appeared several times as I've tried to identify new markets and opportunities to lead you to financial security and maybe even wealth. I have a broad knowledge of the communications field due to the books I've written on data communications and local area networks, and you'll frequently see comments here on the latest happenings among the information utilities (The Source, CompuServe, Dow Jones and others) and on the latest communications hardware and software.

I also cover robotics, telephone systems, computer shows, "the good old days," amateur radio, good books, government regulations (the last two have nothing in common) and many other topics as they pass by. But mainly, I try to tell you what's new and why it's important to you.

I always welcome your comments and contributions. Some of the best leads on new trends and developments come from readers. Contests asking for your ideas on how to use new products and systems are productive and fun.

Please share "Overview" with me. I think you'll enjoy what you see!

This month I'll examine the Symphony program from Lotus Development Corp. (the 1-2-3 people). Symphony is interesting from both marketing and technical viewpoints. But first, I'll look at the Portable PC offered by IBM to see how it stacks up in the marketplace.

### Portable PC

The most successful portable PC was the Compaq computer. The Compaq was not only a portable alternative to the standard IBM system but also a straight substitute for the PC when IBM couldn't provide enough machines to meet the demand. The success of the Compaq led to the introduction of other portables into the market. It became simply a matter of time until IBM released a Portable PC (PPC) of its own.

But when the IBM Portable

Personal Computer 5155 model 68 (the first portable from IBM) came out, only the price and the logo on the front made it an interesting entry into the market. Even though the PCjr is suffering from slow sales now, I think it'll be a much better product for IBM in the long run than the present Portable PC.

First, the model 68 PPC is an unimaginative lead weight. The machine is made from a standard PC XT circuit board (plus an internal CRT and minus the hard disk) wrapped in a different cabinet that has a handle attached. The resulting package is even heavier (30 pounds) than the rather husky Kaypro computers. The greatest limitation to the system, however, is that IBM still hasn't learned that people want expansion capabilities, even in portable systems.

**A New Industry?**

The designers at IBM unknowingly spawned a new industry when they put only five expansion slots in the original IBM PC and then filled three of them with necessary items such as a video card, disk controller and input/output ports. Companies such as Quadram, AST research and Tecmar grew in months into multimillion dollar corporations by finding ways to put multiple gadgets into one IBM expansion slot.

Now, the designers at IBM bring us a PC portable that has only one free full-sized expansion slot after the basic system is configured. You have only one place to put one of the multifunction, memory expansion, voice synthesis, mouse, modem, local area network or other special cards available on the market. Other expansion slots are on the chassis, but they're all shorter than the full-sized cards marketed by many companies.

I'm sure that the add-on card companies, being quick to react to opportunity, are already developing cards to fit into the short and shorter (there are three sizes) slots in the Portable PC. It's a proven fact that people want to use these slots for many different purposes. It's interesting to see that the IBM designers didn't learn their lesson the first time.

On the positive side, the Portable PC is very competitively priced at $2795. This system comes with 256KB of RAM installed, one floppy disk drive and the IBM color graphics video card. An additional disk drive can be purchased for $425. This price schedule not only undercuts Compaq, it also comes in much lower than a similarly equipped standard IBM PC. It's obvious that this will dawn on standard PC buyers eventually, and the price of the standard systems will have to be rolled down. (Although the standard system does give you a little more expansion capability.)

The Portable PC is packaged with a nice nine-inch amber video screen that can display graphics. The keyboard is the standard PC offering with some slight changes to the base to allow it to mate with the PPC cabinet. The single disk drive is made by Qume. IBM claims that the drive isn't the same as the half-height drive in the PCjr, but people who've taken the systems apart say they can't see any difference between the PPC drive, the PCjr drive and the standard product from Qume.

**The Bottom Line**

My bottom line recommendation, if you want to be 100 percent sure that you are and will remain 100 percent "IBM PC Compatible," is to certainly consider the purchase of an IBM Portable PC, even over the purchase of the standard IBM desktop system. If you purchase a standard PC or PC XT, the IBM monochrome board and display combination probably isn't a good investment unless you're absolutely sure that the unit will always be used for text and nothing else.

If you're looking at PC clones, assume that IBM will market new significant products that will in some way check to see if they are being used with the real thing. The aggressive clone makers will certainly respond with ways to fool the suspicious IBM device or software after a while, but are you sure you're buying the product of an aggressive company?

At the present time, I recommend PC clones from Compaq, Zenith and Sperry (Mitsubishi); these companies are big and aggressive enough to keep up with changes IBM might make. The Columbia, Corona and Eagle systems provide good compatibility now. The anticipated PC-compatible portable from Kaypro should be an interesting product because this company is creative and feisty enough to give companies a run for their market share. Oh, and by the way, I continue to recommend the purchase of any of these systems over the Apple Macintosh as it is presently offered to the public. If you have to pay list price for a Mac, it still isn't worth it. . .yet.

All of these comments may be overcome, however, by another announcement that the "grapevine" insists will be coming from IBM soon. The company is expected to release another portable system that's much lighter than the 5155 model 68 and uses a flat screen display technology. Chances are good, however, that the system won't even have the limited expansion capability available in the Portable PC.

IBM has many more products in the pipeline and aces up its sleeve. But its most recent moves have not endangered the PC portable and PC clone makers in any way.

## I Hear a Symphony

Lotus Development Corp. made a very big splash in the software market and in the stock market with only one product: 1-2-3. This integrated spreadsheet, data management and graphics program is one of the first pieces of software to take advantage of the power and memory addressing capability in 16-bit microcomputer systems. But the executives at Lotus, invigorated by the success of their public stock offering, promised new and more spectacular products. According to advance announcements and demonstrations, Lotus Symphony will live up to those promises. Symphony is much more than just 1-2-3 with added functions. It's a complete product that's an alternative to 1-2-3, but Lotus will continue to market 1-2-3 for several reasons.

Symphony's basic functions include a spreadsheet, database manager and graphics package that are better than those in 1-2-3. The package adds word processing and data communications to the original 1-2-3 functions. I haven't had a chance to use either of these new functions yet (this program is still in the "demo-ware" stage), but the demonstrations show that Lotus did a good job designing both of these modules.

Two new techniques, designed to improve the interaction of all of the modules and even other programs (what else do you need?), move Symphony into an area that's very hard to categorize. Symphony uses both windows on the screen and slots in the software to allow you to move data between functional elements and to bring in other programs that you can run as a part of Symphony.

### Fun to Watch

The addition of windows and, particularly, software expansion slots makes Symphony more than a multipurpose applications program. It isn't quite an operating system, but it has more capabilities than an operating system. It's very similar to the program "environments" such as Microsoft's Windows or Quarterdeck Software's DesQ, but it has more capabilities than just these environments.

This summer you're going to see many new software applications products; then the next round of really new hardware will hit the beach.

Symphony advertises that it's compatible with both Windows and DesQ, so you have to wonder if Symphony will run in a DesQ window or if DesQ will run in a Symphony window. At the moment, since all of these programs are just reaching the stage of being real released products, the relationships are unclear. But it will be fun to watch it develop.

It appears that the windows in Symphony won't be as wide open as the windows in Windows or DesQ. The manufacturers of both environments want to attract as many program publishing houses to their standards as they can. It appears that Lotus is pushing programs such as spelling checkers, program management tools and special applications through its windows, but the universal appeal of its standard isn't yet proven.

It's important for you to know that Symphony is a separate program from 1-2-3. Symphony has such strong and intimate ties into the operating system that it may not run on all of the 16-bit MS DOS machines that 1-2-3 now runs on. If your machine isn't 100 percent IBM PC-compatible, it may not be able to run the first release of Symphony even though it can run 1-2-3. You shouldn't hesitate to buy 1-2-3 now, because Symphony will be available as an upgrade to registered 1-2-3 owners for $200. 1-2-3 will continue to be a marketed and supported product from Lotus for two reasons. Symphony might not run on all machines 1-2-3 will run on, and some people might not need the extra capabilities (at extra cost) Symphony provides.

This summer you're going to see many new applications software products and environments. This will be the last major wave of new software before the next round of really new hardware hits the beach. Graphics, voice synthesis and voice recognition products about to be released will kick off another interesting cycle in the microcomputer evolution. Read "Overview" regularly and see where the trend is going.□

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# A> The System Prompt

By Edward Joyce

# Programmers' Pitfalls

## Searching for The Perfect Assembler

### Introducing . . .

Welcome to "The System Prompt." In the world of microcomputers, the operating system region has been the undisputed territory of CP/M (Control Program for Microprocessors) and MS DOS (Microsoft Disk Operating System). Since their inception, these two similar software packages have grown, expanded and matured. Their sophistication now rivals the OSes of the gymnasium-sized computers of years past.

Paralleling this mushrooming complexity in personal computer DOSes is the need for information. Software authors, systems programmers and end users yearn for knowledge on ways to make more effective use of the operating system, on the mystery and magic behind the "A>" prompt and on the features and hazards of function calls and interrupt vectors (which by some strange twist of fate never surface in the user's manual).

*Microcomputing* is setting aside its own operating system region starting with this issue. It's reserved for a monthly dissemination of information regarding CP/M and MS DOS; topics will range from tech tips to software reviews to news stories with an orientation to the computing enthusiast.

The column will serve as a dialogue and information exchange for discerning users who'd like to extract every last bit of utility from their microcomputers. To this end, I'd like to solicit your comments, suggestions, criticisms and gripes. What have you learned that made your life easier in the land of CP/M or MS DOS? What operating system problems defy your best attempts at solution? Share your experiences and drop me a line. (Include a self-addressed stamped envelope for a personal reply.)

Now let me delve into this month's topic—a plea for a decent assembler.

---

### A Plea

You've all heard the story before: "None is worse shod than the shoemaker." Those words of wisdom ring so true today in the computing business—none is worse shod than the programmer.

#### Jocks Running Hard

Software jocks are turning the industry on its ear with computing innovations. Their ingenuity brings microprocessor power to the masses in the form of easy-as-pie spreadsheets, no-sweat word processors, design-your-own electronic filing systems and, of course, the ubiquitous video games. In short, programmers are running hard to keep the information society skating in high gear, but have you ever looked down at the feet of the programmer/cobblers? They're still stuck with shoes dating back 1000 years in computer time.

The shoes of the programmer are the assemblers, linkers, utilities and, in general, the operating system tools with which software artisans ply their trade. Professional programmers know these implements intimately. They use them skillfully to forge programming masterpieces. But the tools of the programmer are rusty—remnants of hardware long ago retired from active duty. While

end-users command state-of-the-art programs, earnest coders, to their credit, are chiseling software monuments with sticks and stones.

### Interpreting Hieroglyphics?

Let's take a case in point: the assemblers of Microsoft and Digital Research. Suppose you want to invoke the assembler on drive A, assemble file TEST.ASM on drive B and put the object and listing files on drive C. Under Microsoft's MS DOS, this would look like "MASM B:TEST.ASM, C:TEST.OBJ, C:TEST .LST/D, C:TEST.CRF." The same thing under Digital Research's ASM86 is "ASM86 TEST.ASM $AB HC PC SC."

Neither garners a booth in the user-friendly corridor of the software hall of fame. MASM does offer an interactive mode. But operating the program still resembles walking a tightrope. One false move and the program flushes you down the tubes. One of the more entertaining games to play with these programs is to type your name on the command line and try to guess what it does.

Compare this interface and operating procedure to Lotus, VisiCalc or WordStar. These programs coddle and pamper the user at every step. A help menu is never more than a keystroke away. The authors recognize the psychology of interacting with a computer. They realize that user's manuals are either misplaced or never read, that human operators *do* make mistakes and that programs are supposed to relate to people, not the other way around. The bottom line is software that's powerful but easy to learn and use.

No operating system utilities can make that claim, especially assemblers. I defy anyone unfamiliar with an assembler to try to figure out the operation of the program without a reference manual propped up next to the CRT. If you can do that, you should be interpreting hieroglyphics in Mayan tombs.

### Simple Enhancements

This isn't to imply that all tools are primitive in the land of microcomputers. Many products, particularly dynamic debuggers and screen-oriented editors, hold their own against the best of the mainframe world. It's a pity, though, when a programmer who's accustomed to the streamlined drive of the popular applications software must step back to the dark ages for compiling assembly language.

Undoubtedly, assembly language ranks high on the scale of esoteric stuff. Some high priests of the cult argue that anyone who can't speak the lingo should be barred from the territory. This attitude notwithstanding, most programmers agree that a generous sprinkling of human engineering in assemblers would enhance the flavor immensely. After all, we made great strides in applications software. Must our system tools remain the artifacts of generations past?

Currently, micro assemblers do a reasonable job of cranking out code. The rich assortment of directives, conditional assembly capabilities and macros chalk up gold stars. But other areas, particularly in operator interface and debugging information, show little imagination. The assembler utilities might be mirror images of their pre-1970 counterparts. Many language compilers rate no better. These programs seem to be dominated by a threefold mission of generating code, numbering source statements and creating a token cross reference. Meanwhile, a wealth of information about the program is left to rot away in RAM.

I'm not proposing an icon-driven, mouse-controlled, multicolored, two megabyte assembler that generates code for 57 varieties of microprocessors (although an icon representing object code would be an interesting conversation piece). No, I'm recommending a handful of simple enhancements that could make life a little easier. These enhancements don't amount to revolutionary developments, nor do they require Josephson junction technology. As matter of fact, some are a decade or more old. It's just that I've yet to see them all under the roof of one assembler.

### Streamlining Strategies

Let's take a critical look at our venerable MASMs, MACs and ASMs to see what can be done to streamline coding in the assembler lane.

I'm just recommending a handful of simple enhancements that could make life a little easier.

First, consider the cross reference. It shows where each label is defined and accessed. Ho-hum. Assemblers have been doing this since day one. Let's give the programmer a cross reference that makes the program listing a genuine debugging tool. Start with an additional right-hand margin reference. In this type of reference, the assembler (or compiler) lists in the right-hand margin the line numbers that define the operands of the statement. The right-hand margin line numbers save the programmer from flipping to the cross reference appended at the end of the listing. The following code sequence illustrates this:

```
1. PREPNTR     DW      1
2. NXPTPNTR    DW      1
3.             MOV     PREPNTR,
                       NXTPNTR
```

If these statements were assembled with a right-hand margin reference, the listing would show the usual code generated in the left-hand column, and beyond the comment field, in the right-hand margin, the statement numbers of the operands would appear. Namely,

3. MOV PREPNTR, NXTPNTR 2. 3.

In some situations, this information is of nominal value since the locations of the operands can be determined by examining the generated code. The machine code in the previous example, for instance, indicates the locations of the variables PREPNTR and NXTPNTR. That machine code is virtually worthless, however, when trying to find label definitions in programs where the location counter changes every 20 lines due to frequent ORG and SEGMENT directives. You will find a

needle in a haystack before pinpointing a location in those cases.

Related to the subject of cross referencing, why not list the registers in the cross reference? It's true that a text editor can find those occurrences, but they should be included in the cross reference, too. Knowing where you've accessed the segment registers, for example, can be invaluable during debugging.

### Play It to the Hilt

The last item on the wish list for the cross reference is an indication of type of reference. In other words, besides showing where variables and registers are accessed, the assemblers should distinguish between read references and write references. How many times, when making a modification or correcting a bug, does a programmer need to know all places where a variable is changed? Sure, you can check all references to the variable in the cross reference, but why overheat the eyeballs? The assembler scrutinizes each line of code. It could easily place this information in the symbol table.

Just as important as knowing what labels are referenced where is knowing what labels are referenced nowhere. Many sneaky bugs creep in by way of a variable or section of code that is inadvertently ignored. These unreferenced labels should be listed prominently, like warning messages, in a section separate from the regular cross reference. You can sequentially check the cross reference for unreferenced labels, but do you want to do that every time a change is made to a program the size of WordStar? Besides, computers are supposed to make life easier—let's play it to the hilt.

Naturally, these cross reference capabilities should be presented as options. Turn them off for the average situation to decrease turnaround. Then when the going gets rough, have the assembler generate a listing packed to the gills with diagnostic information.

Although most micro assemblers offer other execution time options in addition to the cross reference, they add up to a meager selection at best. The option I hear most software developers screaming for is the capability to specify parameters for controlling code generation at assembly time. Several high-level language compilers implement this capability interactively. The technique is commonly used to create slightly different versions of the same program: for example, a spreadsheet program that performs real arithmetic with an 8087 coprocessor versus one that does not. The net effect can be accomplished by editing the source code and changing parameters, but editing is less flexible and somewhat hazardous. Any time you modify source code, regardless of the triviality of the change, you risk introducing a new bug.

Next on the home improvement list for assemblers is the rhyme and reason of generating output files. Have you ever misspelled the name of a source code file when invoking the assembler? Even though the file does not exist on the face of the planet, MASM will stick null object

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and listing files of that name in the directory before informing you, with a cryptic error message, that it can't find the input file. No sign of artificial intelligence there! A smart assembler tries to open the input file before creating object and listing files.

Another behavioral aspect of many assemblers that portrays tunnel vision is the failure to recognize expanded memory. MASM executes in 96KB, period. So what if your system has 512KB that could be put to good use for buffering the source file; the assembler could care less. It knows of only one operating environment. Why not incorporate dynamic memory allocation, you ask? Hey, you're a programmer . . . do it yourself!

### User Who?

Once many assemblers get rolling behind a strong head of steam, they forget about the user, regardless of the length of the job, five minutes or five days. The attitude seems to be "don't bug me, I'm busy," even though you'd like to abort the assembly to edit the source code or execute another program. They may check the keyboard once between passes, but, in the meantime, you turn blue in the face typing in control-Cs. A good assembler regularly listens to the keyboard. After all, the overhead is nominal, and the user, not the assembler, should be in control of the system.

The user seems to have been forgotten by some modern-day architects of development tools. For example, is it too much to ask for meaningful progress messages? Something a little more substantial than "pass one complete." If you're assembling a program the length of a Pascal compiler, knowing that pass one has been completed doesn't tell you a whole hell of a lot. However, knowing that 8000 lines of a 10,000 line Pascal compiler have been processed in pass one—that's something you can plan your lunch around.

Progress messages also reduce hardware-error anxiety. This recently diagnosed psychological neurosis occurs in overworked programmers, inevitably late at night within one to three days of a major project deadline. The patient succumbs to a nervous frenzy while trying to determine if a 24-hour assembly is chugging away on course, or if it has faded away into oblivion due to hardware failure or alpha particles.

With disk systems, you can watch the drive lights for reassurance of meaningful activity. But on RAM disks and Winchesters, you have nothing to stare at but the rock steady sign-on message etched onto the screen.

Speaking of messages, displaying assembly errors on the screen is a good idea—if you have fewer than 24. After that, the assembler continues scrolling and the first messages are paved over. In the old days, when teletypes prevailed, this presented no problem. A paper scroll that accumulated behind the teletype reflected your terminal session and the previous six months of activity. Today, where do you see teletypes except in newsroom scenes of 1950 vintage movies?

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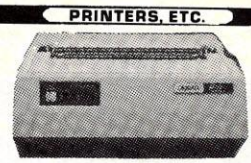
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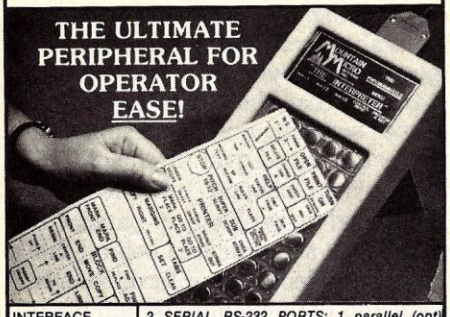
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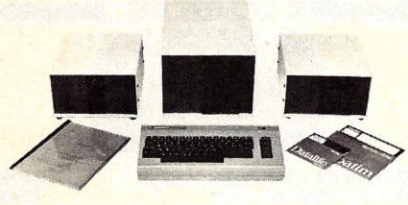
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## The System Prompt

In the quest to conquer new information horizons, software development tools have languished.

What's needed for the CRT environment is a pause on error option. If the pause option is activated, the assembler, after laying out a screen full of error messages, queries the operator before continuing. That way no messages are lost.

Printout headings compete with screen progress messages for least information per square inch. The current date and page number printed by most micro assemblers are a minuscule offering. Any seasoned programmer will tell you that in addition to this, each page should contain the time of assembly, source code filename and an operator-specified title such as "hard disk implementation" or "prototype listing" or "bug-free version" (rarely used). This information proves invaluable when searching through a ceiling-high stack of printouts for the listing reflecting the released code.

### Linker Discourse

No discussion of an assembler stands complete without a few words about the linker. Good linkers do more than just resolve references. They define literals embedded in the object code, test and set location counters and accept comments in the input streams. Defining literals at link time works well for specifying the release date and version number of a program. For example, in a program consisting of modules A, B and C, the release date string may be in module A. If module C changes, however, module A must also be edited and compiled to change the release date. If the linker were able to plug literals into the object code, the release date could be maintained in the link input stream and modification of module A would be unnecessary.

Testing and setting location counters during linking function as conditional assembler directives. A heads-up programmer uses this feature to control memory allocation. For example, the programmer may want to force a certain table to load on a 4KB boundary or verify that the total code size doesn't exceed 64KB.

Linkers with no provision for comments are unthinkable, but they do exist. I'll be reporting them to the software engineering police at the same time I file mental cruelty charges against assemblers without progress messages. There have been times when I was tempted to send a file containing a bare stream of link statements to the National Security Agency for deciphering. It had to be some type of secret code. Well-placed comments could lend some reason to the madness, in addition to greatly enhancing pretty printing (Henry Ledgard's Programming Proverb 19).

### New Shoes Needed

The assembler is to the systems programmer what the net is to the fisherman, the hammer is to the carpenter and the stethoscope is to the doctor. It's the most basic tool from which all software stems. Unfortunately, in the quest to conquer the expanding horizons of the information age, the tools of software development have languished.

New shoes for programmers of micros are long overdue. Software aces attack the applications market all the time cursing the primitive instruments they're forced to use. The preoccupation with end users leaves a wide open window for development aids. Microsoft's assembler ranks in the top thirty bestselling software products—there's definitely a demand for programming tools. The best features of assemblers and compilers have long existed, albeit scattered across several languages on dozens of computers. Isn't it about time someone tied all the pieces together?□

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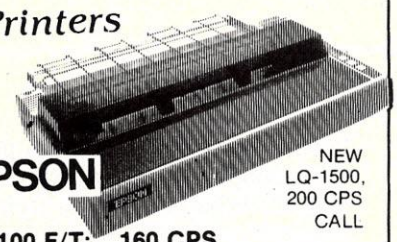


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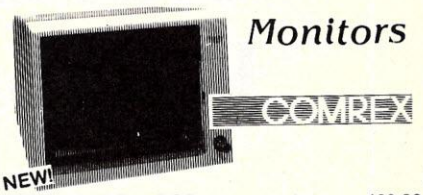
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# The Database Manager

By Shawn Bryan

# Tracking the Database Field

## News from Ashton-Tate, Micro Data Base Systems And Microrim

The birth of a new column is often the result of increased interest in a particular subject. Tremendous growth is occurring in the number of software products available for database management, and this field is cited as one of the fastest growing markets in the software industry.

### Conviction

The genesis of this column is a conviction by *Microcomputing* that at the heart of all we do with computers is information management. In this column, I'll report on what's new in the field, talk about problems you have and offer advice and sanctuary to those who've lost their way.

When we hear the term "database management," most of us immediately think of complex and hard-to-learn programs that use a command language and require programming. Many other programs out there don't require this kind of commitment in time and talent. Some of them aren't worth owning and some do a marvelous job within the limits imposed by their nature. I'll try to let you know which ones to avoid and which ones to consider.

I'll also be looking at specialized database management packages. Many of the new integrated software packages, for example, use database management programs as a core and build other functions around it as satellites.

I'll be looking at these programs to see just how well integration is coming along. Database management program command languages are the basis from which many accounting, payroll and inventory programs are developed. I'd like to look at these professionally developed programs to see how they stack up against things you might undertake to do yourself. I hope to offer advice and consolation to a larger audience than just those who think of database management as a program or a language.

Because developments are occurring so quickly, an important function of this column is to keep you informed of the latest happenings in database management.

I know that you have ideas and experiences worth sharing—let this column serve as a forum for your kudos and complaints. Who provides good support and who doesn't? What seminar or training sessions are worth attending and which are a waste of time and money? What can you share with other readers that may save them either time or money? What tricks or tips can you share about a particular program?

What questions do you have? Are there problems that you have with an application that you think someone might be able to help you with? If so, send in your questions and I'll try to answer them. If I don't have the answer, I'll have the resources to get you an answer. This is your column, and much of its value is as a resource for sharing information.

### Have You Heard . . . ?

Ashton-Tate recently held a nationwide news conference that was spectacular in its content as well as in its technology. Through a 900 number furnished by Ashton-Tate, members of the computer press from outlying areas were permitted to listen in as multi-user dBase II was announced.

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The program is described as similar in design to dBase II. It doesn't offer any new commands or capabilities beyond networking support, so if you were expecting a more powerful version of the original, you'll be disappointed. Ashton-Tate is hitting a segment of the market that hasn't been big enough to draw a large following until now. Networked systems are starting to catch on, and Ashton-Tate has wisely decided to position itself with a product for that market.

As for the press conference by phone, it was interesting. You could hear the tinkle of glasses, and by closing your eyes, you could almost smell the cigarette smoke in the stuffy conference room. While nothing specific is out yet, look for some more news from Ashton-Tate. I expect some big announcements from the old flagship in databases in the not-too-distant future. Stay tuned here for the latest.

Microrim announced two new products, R:base 2000 and 6000. R:base 2000 is a smaller version of the popular R:base 4000 that supports files of up to 65,000 records. R:base 6000 is a multi-user version of the 4000 series and may give the new multi-user dBase II a run for its money.

**Rodents**

Micro Data Base Systems, creators of KnowledgeMan and MDBS III, also announced some new products. You can now order KnowledgeMan with a graphics module, a forms painting module and a text editor. A run-time version of the program was also announced.

KMouse, a software product that supports the Microsoft mouse, is on the horizon. It lets you rodent fans use pull-down menus and other "pointing friendly" methods of software operation.

Version 1.06 of the KnowledgeManager is also here. According to Scott Palmer at MDBS, the new version is required to support the K series and, as an additional advantage, offers significant speed enhancements over the 1.05 version. Version 1.07 is being discussed and will feature extensive on-line help messages. MDBS is definitely a force to be reckoned with.

The other day, I received a copy of Salvo by Software Automation, Inc. I haven't had a chance to try it out, but I've been through part of the tutorial section. If you're tired of programming languages and just want to manage your information, Salvo offers a glimpse of where you're going. Using a visual approach coupled with some artificial intelligence technology, Salvo takes what you give it (in plain English) and designs a database for you. If it works the way it's advertised, Salvo may take us another step closer to truly friendly database management software.

Unify Corp. announced that it will make a relational database management program available for the Apple Lisa 2 series of computers. Unify runs under Unix and offers a complete set of programmer's tools for application development.

A program I recently received that may set some new ease-of-use standards is Power-Base from GMS Systems. The new version of the program is advertised as cutting programming time significantly by using natural English-like commands and automatic relational coupling.

I just received a copy of the 2.04 version of Dataease from Software Solutions, Inc. and it looks like it may be a head-to-head competitor to Power-Base. I'll try to compare the two in next month's column.

I've also heard from Alpha Software (DataBase Manager II people). The company is working on a new version of its package with greatly enhanced screen-handling features. I'll keep you posted.

**Seems to Me...**

One of the directions we're going faster and faster toward is easy-to-use but powerful database management. Programs like Salvo will make it possible for people to sit down and do their own custom applications. When this happens, a lot of the third-rate accounting packages and mailing list programs may go the way of Osborne and Victor.

Much of the applications software now available is inflexible and makes you conform to its demands, not the other way around. With an easy-to-use but powerful database management package, the business person can design his own system to respond to his specific needs. No more compromises.

Will it happen this year? Probably not, but the beginnings are evident—good news for those who grapple with the problem of accounting software that forces you to meet its needs. The servant may soon become the master.

Speaking of servants and masters, you've probably felt more like a slave than a master to some of the database management programs around. I'm speaking primarily of the command languages, dBase II, KnowledgeMan, Condor and so on. If you own one of these programs, a lot of training is available to help you become a better master. dBase II classes abound and Ashton-Tate publishes a dBase newsletter. Micro Data Base Systems offers seminars on using KnowledgeMan, and Condor supports user training through a newsletter and user groups. It will be a big help if those of you who use these services or others will share what you think of the training you've been offered.

The user's groups of some of the computer clubs and societies are another source of training and support. The Boston Computer Society sponsors a database user's group. Other clubs probably do the same. If you send in names and addresses with meeting times and locations, they'll be published in our Club Notes section.

## Future Happenings

One of the trends I've noticed in database management is the increased power of the programs that are offered. Many of these programs offer minicomputer power in micro packages—but not without some expense on your part.

Revelation by Cosmos, Inc. is a good example. This package uses the Pick operating system and requires an 8087 coprocessor on the IBM PC along with 320KB of memory. The price tag: $950. Another such program is MicroFocus, a downscaled mainframe DBMS now being aggressively marketed for the PC by Information Builders, Inc.

This one requires a fixed disk and 520KB of memory.

What's happening is a further dilution of the distinction between minis, micros and the mainframes. This bodes well for those of us using micros, but raises some very interesting questions about the use of this kind of power. The limitations are rapidly becoming only hardware limits; the software can handle records and files as large as we may possibly need.

The challenge is to the imagination. Since the limits of what can be done now are being pushed out rapidly, will we be bright enough and resourceful enough to capitalize on the new power offered to us?

If you're looking for an expanding job market to head into, perhaps you should consider becoming a database management programmer. I predict this field will grow like wildfire as people purchase these new packages and then realize they don't have the time, energy or talent to tame them.

According to the salesmen, the fourth generation of database management programs is here. No one has really defined that term for me to my satisfaction, but James Martin, in his book *Application Development Without Programmers*, does attempt an explanation of what a fourth generation language should look like. I recommend it as informative reading for those who want to know more about relational database management.

Next month I'll discuss some training programs for people who can't get to a class on database programming and I'll take a closer look at Salvo. I'll also discuss some other recent releases, including Power Base and VersaForm. If there's a program you'd like more information about, let me know. I'll see if I can get a copy for review.□

*Address correspondence to Shawn Bryan, Datatek, Montpelier Junction, Montpelier, VT 05602, or contact Shawn on The Source, BBP6810.*

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# The Unix Pipeline

By Phil Hughes

## Once Upon A Time . . .

### Unix: The Life and Times Of an Operating System

Unix and its derivatives are fast becoming the standard operating system for medium- and large-scale 16-bit microcomputers. Just about every month, Unix becomes available on another microcomputer system. The purpose of this column is to present information that helps *Microcomputing* readers learn about Unix and assess whether or not they need its capabilities.

This first column presents the history of Unix and illustrates the use of the print command, pr. Each future column will present a Unix concept and demonstrate the use of a program, either supplied with Unix or available separately. The subjects I'll cover will be directed by reader requests. Some inquiries will be answered in a question-and-answer format; others will influence future column topics.

I'd like to encourage readers to send inquiries to me at the address below. This column is for you and I want to find out what questions you'd like answered.

**In the Beginning . . .**

Unix is the name given to Bell Telephone Laboratories' family of operating systems and associated utility programs. The history begins with a Bell Labs employee named Ken Thompson. In 1969, Thompson and Dennis Ritchie start building a primitive operating system on a PDP-7 computer. By 1970, a two-user timesharing system is running. At that time Brian Kernighan contributes the name Unix. During the next three years, Thompson and Ritchie rewrite Unix for the PDP-11 and add new features and utility programs.

In 1973, Ritchie develops a new language, C, which allows access to all the capabilities of the computer hardware without having to deal with the housekeeping. Thompson and Ritchie then rewrite Unix in C.

In 1975, the sixth edition of Unix becomes available and is publicly distributed, primarily to colleges.

Between the sixth and seventh editions of Unix, allowances are made for larger files. Parts of the system are rewritten to make it compatible with other types of computer hardware. The seventh edition, released in 1979, is still the basis for many of the currently available flavors of Unix.

Just to bring you up to date, release III or System III of Unix was available in 1980. (Yes, System III really is newer than the seventh edition.) Finally, System V was released in 1983. Both of these releases add features to Unix, fix problems and improve its performance.

One other major source of Unix updates (outside Bell Labs) is the University of California at Berkeley, which produces additions and modifications to the Bell Unix software. The most popular are called Berkeley release 4.1 and 4.2, or BSD 4.1 and BSD 4.2. Generally, a vendor will package some or all of these enhancements and bill his system as including them. For example, my system is running Unix version 7 with Berkeley 4.1 enhancements.

**Good Buy**

Most of the Unix implementations from Bell Labs are for the PDP-11 and VAX-11 computers. If you're shopping for a microcomputer running Unix, you'll probably be looking at what is called a "port" of Unix to the micro by someone other than Bell Labs.

To port Unix to another system, you purchase source code from Bell Laboratories, make the necessary modifications to run it on a specific piece of hardware and then pay royalties to Bell Labs for every copy sold. This amounts to spending more than $50,000 and many person-years of effort.

Fortunately, many companies have already done this. All you have to do is purchase a computer capable of running a port and then pay the price of Unix for that computer.

While I'm on the subject of price, I expect you're wondering what a copy of Unix costs. Well, prices vary considerably depending on what the standard utility programs are with each version, how large your computer system is and what type of support is offered. A ballpark guess is $300 to $3000.

Unix prices vary considerably, but don't run away from big numbers. Bundled software makes the purchase of other programs unnecessary.

Don't run away because of the big numbers. In the next few months, I'll show you all the software that you get for your initial investment. For example, text editors, document processing systems, assemblers and compilers, sort programs and literally hundreds of other utilities save you time and make the purchase of other programs unnecessary.

Table 1 lists the names and a short description of the utility programs distributed with Unix System III. If you don't believe this is a good buy, figure out what it would cost to add all the necessary and desirable utilities to a $100 operating system. I expect that you'll find that it will cost as much or more than Unix.

An additional advantage to bundling these utilities with Unix is that they're standard. More people use

*Table 1. System III Unix commands available in the standard System III release from Bell Labs. Graphics commands and commands that are either only available to the systems administrator (super user) or are considered system maintenance commands are not included. This list was extracted from the section headings of the Unix command summary published by Specialized Systems Consultants.*

```
300, 300s - DASI 300, 300s Terminal Handler
4014 - Tektronix 4014 Paginator
450 - DASI 450 Terminal Handler
ACCTCOM - Process Accounting
ADB - General Purpose Debugger
ADMIN - Administer SCCS Files
AR - Archive and Library Maintainer
ARCV - Convert Archive File Format
AS - PDP-11 Assembler
AS - VAX Assembler
AWK - Pattern Scanning Language
BANNER - Print Banner with Large Letters
BASENAME - Delete Prefix & Suffix from Pathname
BC - Unlimited Precision Arithmetic Language
BDIFF - Compare Big Files
BFS - Big File Scanner (Read-Only ED)
BS - Compiled/Interpreted Language
CAL - Print Calendar
CALENDAR - Reminder Service
CAT - Concatenate and Print Files
CB - Beautify C Programs
CC - C Compiler
CD - Change Directory
CDC - Change SCCS Delta Comments
CHECKCW - Checks Constant Width Text
CHECKEQ - Check EQN Input (See EQN)
CHGRP - Change Group ID of Files
CHMOD - Change Access Modes
CHOWN - Change Owner of Files
CMP - Compare Two Files
COL - Filter Reverse Line-Feeds from stdin
COMB - Combine SCCS Deltas
COMM - Select or Reject Common Lines
CP - Copy File or Files to Specified Directory
CPIO - Copy Archives
CREF - C or Assembler Cross Reference
CRYPT - Encrypt/Decrypt stdin to stdout
CSPLIT - Split File
CT - Call Terminal and Start Login Process
CU - Call UNIX System
CUT - Cut Out Fields of File
CW - Prepare Constant Width Text for Typesetting
DATE - Print Current Date
DC - Desk Calculator
DD - Convert and Copy File
DELTA - Install a Change into SCCS Files
DEROFF - Remove Formatter Constructs
DF - Report Free Block Count
DIFF - Differential File Comparer
DIFF3 - Three Way File Compare
DIFFMK - Build 'Change Mark' File for N/TROFF
DIRCMP - Compare Two Directories and Print Differences
DIRNAME - Delete End of Pathname
DU - Summarize Disk Usage
ECHO - Echo Arguments
ED - Text Editor
EFL - Extended Fortran Language
EGREP - Search File for Pattern
ENV - Alter Environment and Execute Command
EQN - Format Mathematical Text for Troff
EXPR - Evaluate Expression Arguments
F77 - Fortran 77 Compiler
FACTOR - Factor a Number and Print Prime Factors
FALSE - Returns Unsuccessful Exit Status
FGREP - Search File for Pattern
FILE - Attempt to Classify Files
FIND - Find Files
GET - Retrieve an SCCS File Version
GETOPT - Parse Command Options
GREEK - Setup Extended Character Set Filter
GREP - Search File for Pattern
HELP - Explain a Message or Command
HP - Handle Special Functions of HP2640 & 2621
HYPHEN - Find Hyphenated Words and Print
ID - Print User & Group IDs and Names
JOIN - Form the Join of Two Relations
KAS - KMC11 Microprocessor Assember
KILL - Terminate or Send a Signal to Processes
KUN - KMC11 Microprocessor Un-Assembler
LD - Linkage Editor
LEX - Generate Lexical Analysis Programs
LINE - Copy One Line from stdin to stdout
LINT - C Program Checker
LN - Make Links to Files
LOGIN - Sign On to System
LOGNAME - Print Login Name
LORDER - Find Ordering Relation for Archive Files
LPR - Spool Output to Line Printer
```

*Table continued.*

the same program, which decreases the number of bugs and the cost of reference material. Also, you can travel from one Unix system to another without having to relearn the use of many programs.

Enough bragging about Unix; I want to explain how to use the pr utility to show you the type of utility programs that are supplied with Unix.

### The Print File Utility

An example of an average utility in Unix is pr. It does more than some, but less than the more sophisticated utilities. I selected it as the first example because it's useful no matter what you use Unix for. Also, it's easy to understand without knowing the other parts of Unix.

> Once you understand the basic format of executing a command, it's relatively easy to make it do what you want.

In its simplest case, pr prints a specified file separated into pages headed by the date, filename and page number. For example, if I have a file named test that contains the following:

```
This is a test file.
It is set up to demonstrate the operation
of the Unix utility program pr.
```

and I enter the following command:

```
pr test
```

I'll get the following:

```
Dec 9 21:09 1983 test Page 1
This is a test file.
It is set up to demonstrate the operation of
the Unix utility program pr.
```

The useful application of the default case for pr is to produce a titled and paginated listing of a program or a file. In order to perform this task, pr has to make some assumptions about what you want. Here's a list of those assumptions:

- The page width is 72 columns.

*Table continued.*

```
LS - List Contents of Directories
M4 - Macro Preprocessor
MAIL - Send or Read Mail
MAKE - Maintain Program Groups
MAN - Print Manual Entries
MESG - Permit or Deny Messages via Write
MKDIR - Create Specified Directories
MM - Print MM Format Documents
MMCHEK - Check MM Macro Usage
MMT - Typeset MM Documents
MV - Move Files
MVT - Typeset Viewgraphs
NEQN - Nroff Compatible Math Formatter
NEWGRP - Login to New Group
NEWS - Print News Items
NICE - Run Command at Low Priority
NL - Line Numbering Filter
NM - Print Symbol Table
NOHUP - Run Command Ignoring Hangups
NROFF - Format Text
OD - File Dump
PACK - Compress Files
PASSWD - Change Login Password
PASTE - Horizontally Concatenate Files
PCAT - Unpack and Concatenate Packed Files
PCC - Portable  C Compiler
PR - Print Files
PRIMES - Print Primes
PROF - Display Profile Data
PRS - Print Parts of SCCS Files
PS - Report Process Status
PTX - Permuted Index
PWD - Print Working Directory Name
RATFOR - Rational Fortran Translator
REGCMP - Compile Regular Expression
RM - Remove Files
RMAIL - Mail: Send Only
RMDEL - Remove an SCCS Delta Version
RMDIR - Remove Empty Directories
RSH - Restricted Shell
SACT - Print SCCS Files with Versions
       Out for Editing
SCC - C Compiler to Generate Stand-Alone Programs
SCCS - Source Code Control System
SCCSDIFF - Print Differences Between Two
           SCCS Versions
SDB - Symbolic Debugger for C & F77 (VAX only)
SDIFF - Side-By-Side Difference
SED - Stream Editor
SH - Bourne Shell
SIZE - Size of Object File
SLEEP - Suspend Execution for Specified
        Number of Seconds
SNO - Snobol Interpreter
SORT - Sort/Merge Files
SPELL - Find Spelling Errors
SPLIT - Break File into Pieces
STRIP - Remove Symbol Table and Relocation Bits
STTY - Set Terminal Options
SU - Become Another User
SUM - Compute File Checksum
TABS - Set Terminal Tabs
TAIL - Output Last Part of File
TAR - Tape File Archiver
TBL - Format Tables (n/troff)
TC - Phototypesetter Simulator
TEE - Copy stdin to stdout and File
TEST - Condition Evaluation
TIME - Print a Command's Elapsed, System and
       User Times on stderr
TIMEX - Print a Command's Time and System
        Activity on stderr
TOUCH - Update File Access/Modification Times
TR - Translate Characters
TROFF - Typeset Text
TRUE - Return Successful Exit Status
TSORT - Topological Sort
TTY - Display Terminal's Name
UMASK - Set File Creation Mask
UNAME - Print System Name
UNGET - Void SCCS File Gets
UNIQ - Report Repeated Lines
UNITS - Interactive Measurement Units Conversion
UNPACK - Unpack Compressed File
UUCP - UNIX to UNIX Copy
UULOG - Uucp Log Maintainer
UUNAME - List Uucp Names of Systems
UUPICK - Accept/Reject Uuto Files
UUSTAT - Get Status of UUCP Work
UUTO - Public UNIX-to-UNIX File Copy
UUX - Remote UNIX Command Execution
VAL - Validate SCCS Files
VPR - Spooler for Versatec Printer
WAIT - Wait for All Background
       Processes to Complete
WC - Count Lines, Words & Characters
WHAT - Print SCCS Identifying Information
WHO - Who is on the System
WRITE - Write to Another User
XARGS - Construct Argument List & Execute
XREF - C Cross Reference
YACC - Yet Another Compiler Compiler
```

```
% pr [options] [files]
        stdin read if - or no files specified
Options:
        -a      print multi-column output across page
        -d      print double spaced
        -ecn    expand input tabs to every nth position using
                c as tab char (n=8 default; c=tab default)
        -f      use form feed character for new page,
                pause for new pages if stdout is to terminal
        -h      use next arg as heading line (files default)
        -icn    convert whitespace to tabs every nth position
                c as tab char (n=8 default; c=tab default)
        -ln     set page length to n lines (66 default)
        -m      merge and print all files, one per column
        -ncn    number lines with n-wide numbers followed by c
                (n=5 default; c=tab default)
        +k      begin printing at page k (1 default)
        -k      produce k column output (1 default)
        -on     set line offset to n (0 default)
        -p      pause between pages if output is to a terminal
        -r      suppress errors if files cannot be opened
        -sc     set column separator to c (tab default)
        -t      suppress page heading and trailing lines
        -wn     set line width to n (72 default for equal width
                multi-column output, no limit otherwise)

Conventions:
        A % represents the system prompt
        Bold face represents items that must be typed
        as they appear.
        Italics represent items that are to be
        substituted for.
        Brackets [ ] surround items that are optional.
```

*Table 2. The Unix Print command (pr).*

- You want only one column on the page.
- Printing should start with the first page.
- You want page headers and footers.
- You want the default page header.
- The page has a total of 66 lines.

These are strictly assumptions to make it easy to use pr. If you don't use any options, pr defaults to the most common case. If you want to do something else, you can alter any of these assumptions with the use of options. For example, let's say you want to produce the same type of output but print the title "I know about one of the pr options" on the top of the page instead of the filename. Well, the -h option does that function. Here is the necessary command:

```
pr -h "I know about one of the pr options"
test
```

and here is the generated output:

```
Dec 9 21:09 1983 I know about one of the pr
options Page 1

This is a test file.
It is set up to demonstrate the operation of
the Unix utility program pr.
```

At this point, let me direct you to Table 2. This table is a condensed description of the pr command. It shows how to invoke pr and explains its options. The conventions used in Table 2 are essentially those used in the Bell Unix manuals. I'll explain more of the conventions in future columns, but for now understanding the use of **boldface**, medium Roman, *italic* and [brackets] will suffice.

Using Table 2, let's figure out how to print out the two files col1 and col2 side by side. Further, let's suppress the page headers usually printed by pr. First, here are what the files look like:

```
I am col1. I am to be printed in the left column of the output from pr.
```

```
I am col2. I am to be printed in the right column of the output. I will be separated from col1 when printed.
```

Now, referring to Table 2, the command line appears as follows:

```
pr [options] [files]
```

Using the conventions, the pr is typed as indicated and both options and files are substituted for. Files are simply the names of the files to be processed, in this case col1 and col2. Therefore, col1 and col2 are entered after the necessary options.

Looking at the options in Table 2, you see that you need the -m option to cause the files to be printed one per column and the -t option to suppress the page headers. Although the -a and -k options appear related, it turns out that the -m option automatically takes care of these things. As a result, the command line necessary is as follows:

```
pr -m -t col1 col2
```

and the resulting output is:

```
I am col1. I am to be printed in the left column of the output from pr.
```

```
I am col2. I am to be printed in the right column of the output. I will be separated from col1 when printed.
```

As you can see from the available options, you can do many other things with pr. If you have access to a Unix system, you may want to try some of the other options. If you don't have access to Unix, it's sufficient to say that things are possible with Unix commands that require programming on most other operating systems.

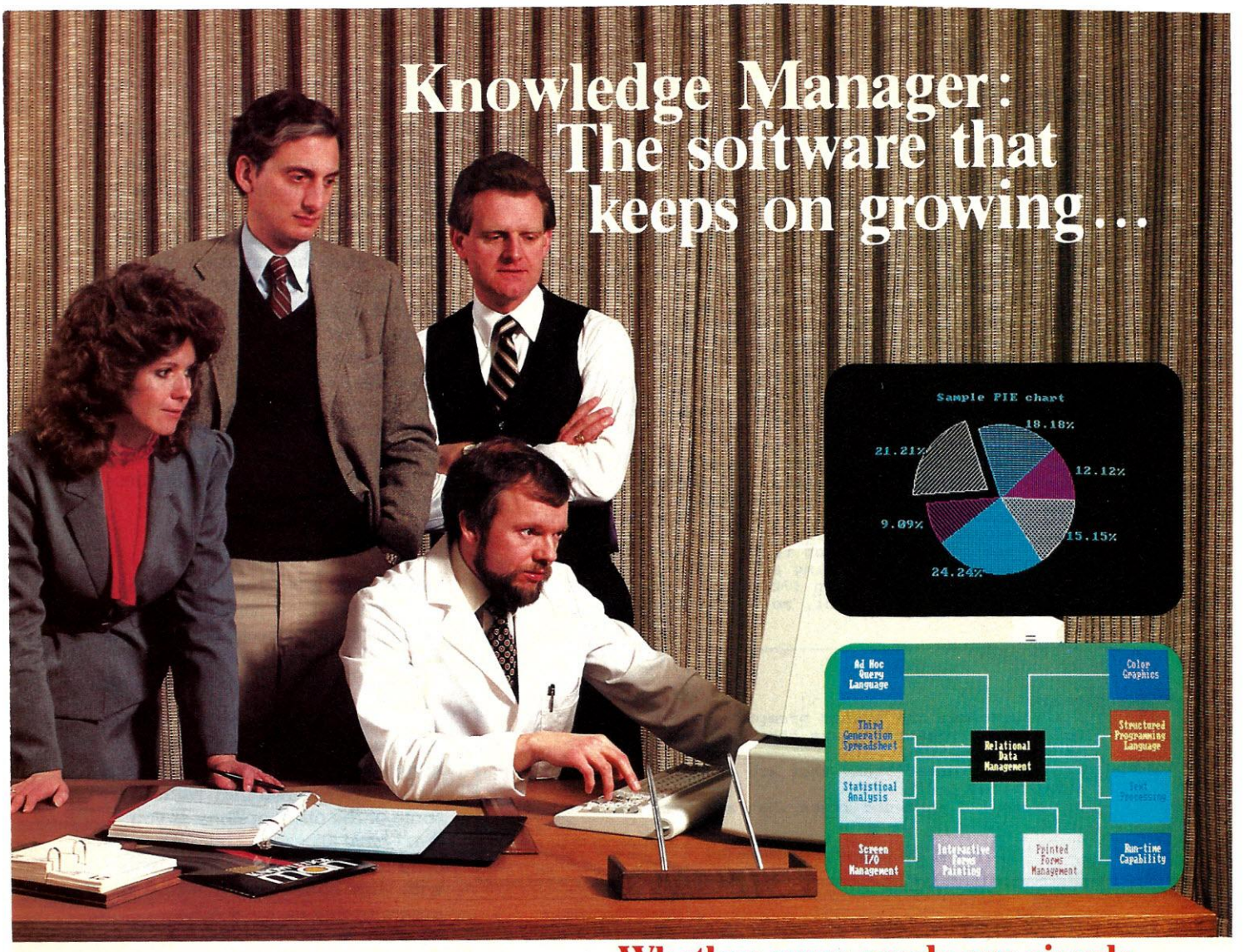
### A Taste

Hopefully, you now have a taste of the type of utilities that come with Unix. There are more than 200 of these utility programs, some simpler than pr and many much more complicated. Once you understand the basic format of executing a command, it's relatively easy to make it do what you want. The hard part is finding the command that actually performs the desired task. For this reason, I'll talk about how to use the available utility programs to accomplish common tasks in future columns.

Next month, I'll cover the basic concepts of the Unix shell, the program that interprets your commands and controls where program input comes from and where the output goes. Then I'll describe cat, a command used to create and manipulate files.□

*Address correspondence to Phil Hughes, PO Box 7, Northgate Station, Seattle, WA 98125-0007.*

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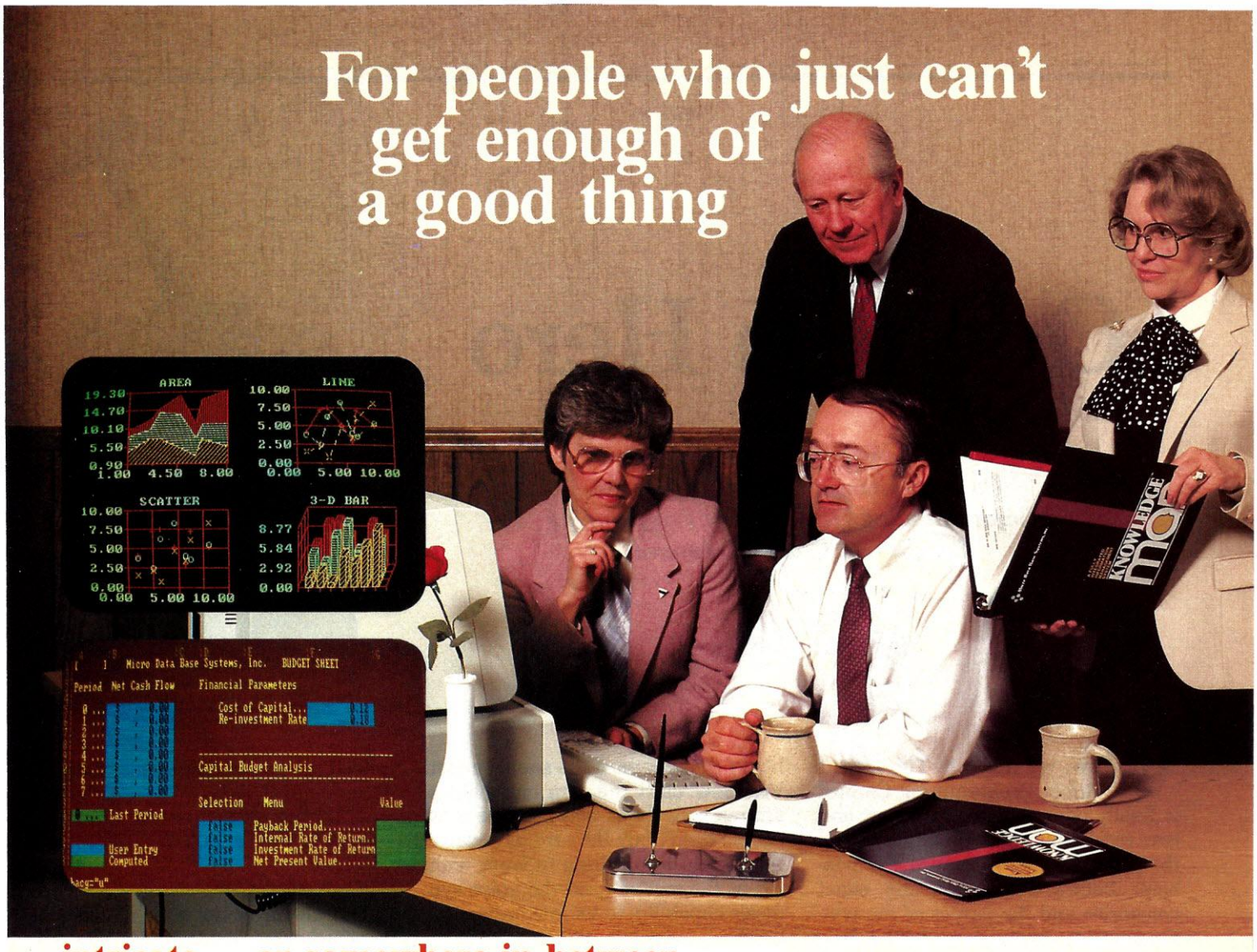
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# Ode to a Hero



*Congratulations to the winners of the* **Microcomputing** *Hero-1 Robot Programming Contest and to all who entered.*

By Mark Robillard

Wow, we made it! The Hero-1 Robot Programming Contest is finally over. After a false start and two reschedules, we finally reached the point where we judged the winners. Before I tell you the exact categories and the names of the winning entries, I'd like to explain a little bit about the contest and what we were trying to accomplish.

Hero-1 is a revolutionary product for its time. It's the first fully integrated robot kit offered to the general consumer. Many people ask me, "What do you do with a robot?" That's a tough question to answer.

It's a little like the questions that were posed about personal computers. It's pretty obvious that people have found so many uses for personal computers that millions of you now have them in your homes.

Robot use will obviously grow in the same way. However, because we're not yet used to living with robots, we find it hard to come up with applications for them. It's not that applications don't exist; it's just that our brains sometimes take for granted the little things that we could have a robot do. Hero is a good example of a robot who can do many things. However, as many of you who bought the kit discovered, it does have certain limitations.

These limitations were borne out in the various applications that came in. Many of them used the sonar ranger. Very few used the arm capabilities. I'm not sure if this was because most people didn't buy the arm or because they found it too tiring to work with. All of the entries used the voice synthesis capability to its maximum.

### Marketability

What do you look for in an application? Well, that depends on the application itself. These days, marketing a robot such as Hero-1 becomes a tiring task if you don't have some sort of demo that sufficiently shows its capabilities. The Heath Company has been looking for such demos. The purpose of the Hero-1 Programming Contest was to ferret out some demos from you imaginers.

Surprisingly enough, we received entries in only two application areas. All were in the category of the standard unmodified Hero. They ranged from demo-type programs to utilities. You can argue for both types. Some computer fans thrive on building various utilities for their machines. Others tend to lean toward unique demo-type programs that amuse their friends and push the limits of the adaptability of the product.

In this vein, I feel that it's only fair to split the entries on utility and demo sides. The original idea was to give a first prize in each of two categories. In light of the entries that we received, these two new categories are Demo and Utility. Without further ado, let me announce the first prize winner in the Demo category.

### Winner #1—Demo Category

The Demo prize goes to Charley Wolfersberger of St. Louis, MO. His just-under-the-wire entry programmed Hero to wander around an area using its sonar range finder. Upon detecting an obstacle in its way, it stops, backs up a few steps and recites an amusing phrase. The first phrase it uses is, "I have detected an obstacle in my path. Are you sure this is the way to the bathroom? I'll try again." The second is, "Excuse me, sir, my microprocessor indicates a disturbance on my analog-to-digital converter. Are there any spare integrated circuits in the house?" I find both of these phrases amusing. I've been to many trade shows where remote control robots run rampant through the hallways. A self-contained demo such as this, with these phrases programmed in, would be a hit at any party or in any demo-type application.

After repeated attempts, I still couldn't get Hero to hit a wall. The closest it ever came was to touch, ever so lightly, the edge of a refrigerator door, probably because of the angle at which the robot was facing the door. However, several times the robot detected an obstacle where

there was obviously a clear field. This is still acceptable as long as the robot doesn't hit any obstacles.

A program similar to this one arrived early on in the contest. It too wandered around the room looking for obstacles. However, when it did detect an obstacle, it simply stated that something was in its way. It didn't have, in my opinion, the pizzazz or the marketability of the Wolfersberger program, and it repeatedly made errors in judgement when it came to an obstacle and crashed into things.

This isn't entirely the fault of the programmer or his program. If you have worked at all with the Hero robot, you've found that the ultrasonic ranger is very sensitive, especially when it's being used while the robot is in motion. Vibrations from the motion of the robot tend to misalign the ultrasound pulses from the receiver and present troublesome reflections for the system.

Our congratulations go to Charley Wolfersberger.

**Winner #2**

As I said earlier, utilities scored big in the Robot Contest. One in particular required a great deal of external equipment to run. However, it was the first serious attempt I've seen by an individual party to provide the solution to a problem in the Hero system.

Hero, as you may know, is programmed by 6800 assembly language code. For many of you, this is a problem. If you're not familiar with the microprocessor or with assembly language programming in general, Hero becomes a bad investment for you.

Students at Loyola University in New Orleans, LA entered a fantastic Hero development system program. By fantastic, I mean that they programmed, in Basic, a complete Hero assembler. This assembler provides the ability to use standard 6800 op codes and op codes that they produced for all of the Hero instructions. By using this assembler, you can program with the standard mnemonics without worrying about offset addresses and machine code equivalents. No, it's not a Basic but at least it's one step up from what Hero provides.

The only unfortunate part of the Loyola University entry is the fact that it requires an Apple Computer. In actuality, that isn't a true statement. In going over the code, I found that it's quite easy to convert Apple Basic to many other Basics. You may find that it's applicable, especially in just the design of the assembler itself. Yes, a Basic-written assembler is slow, but it's better than nothing. If you can't afford a 6800 assembler and don't have access to a Hero assembler (which I'm sure 99 percent of you don't), this is one way to get there.

Let me explain something else. Loyola also provided a fine machine language download program to the Hero. One part is on the disk as part of the assembler. The other part is on cassette and loads into Hero and provides serial communication with Hero. It does require a little bit of circuitry plugged into the experimenter's board on Hero's head to convert the RS-232C levels of your computer to Hero's accepted codes. However, in all of the utilities sent, this one has to be the most well-planned, well-documented and original of all. There fore, our congratulations go to the students in the department of Mathematical Sciences at Loyola University.

**Wrap-Up**

We've learned a lot from sponsoring the Hero contest. First, it takes a lot longer than you think to come up with robot applications. The first deadline of only three months was obviously too ambitious. Many of the entries arrived before the second deadline and, as I mentioned, the winner in the Demo category came in right under the wire of the third deadline. Robotics is in its infancy and we need more forward thinkers like those responsible for the fine applications that came into the *Microcomputing* offices.

Every entry was well-documented and professionally done on good quality cassette tapes. We thank all of the entrants who supplied us with programs and would like to keep in touch with you programmers as you develop better and better applications throughout the years.

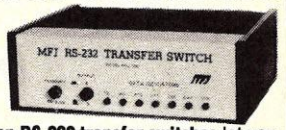
Complete reprints of the two winning entries will be included in an upcoming issue of *Microcomputing*.■

*Mark Robillard, author of* Microcomputing's *monthly Techniques column, can be contacted at MJR Digital, PO Box 630, Townsend, MA 01469.*

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# Covering All The Databases

*This month, we present Part 1 of Shawn Bryan's three-part series on database management programs. The trilogy begins with reviews of KnowledgeMan and R:base. Next month, Shawn focuses on dBase II, Condor 3 and Data Base Manager II. In August, the epic ends with reviews of the Concentric Information Processor, ResQ and Aura, as well as a chart comparing the features of the eight packages.*

By Shawn Bryan

If spreadsheet programs have been the Beauty in the fairytale microcomputer world, then the Beast is the database manager.

Where spreadsheets are simple in concept and easy to use, database managers are generally complicated in execution and design. While spreadsheets use terms from our everyday vocabulary, many database managers use a programming language all their own. Spreadsheets trip lightly through columns of numbers; database managers crush fields of information with their power. Spreadsheets are easy to learn; database managers usually are not.

It isn't just the programs that strike fear in the hearts of many but the documentation as well. Many of the manuals come in 8½ by 11-inch three-ring binders. No photographs or drawings break up the pages of text—white space is unheard of. Page after page of elite type at 12 characters per inch grace these manuals, and it still takes hundreds of pages to cover the subject. The manuals are filled with appendixes on interfacing with Pascal, Basic, C or some other language you've never even heard of. The appendixes also catalog long lists of error messages and command syntax requirements.

**Bunch of Brutes**

To prepare for this review, I read more than a thousand pages of this turgid writing. I quickly discovered that this was a supreme challenge: to write about eight different database management programs. Each program must be evaluated objectively. At the same time, each program has special twists and turns that have to be explored. Some are easy to learn and offer little more than basic file management. But the brutes of the bunch, R:base, KnowledgeMan, Condor and dBase II take days and weeks to learn when you take them one at a time.

How was I to learn enough to write about four such programs, keep them separate in my mind and still compare them? I quickly discovered that, in many ways, these programs are more alike than they are different. Each may claim its individuality, but essentially each program does one thing: it allows you to keep and maneuver information and call it back later when you're trying to find something.

There are only so many ways to do this. What at first looked like an exciting opportunity quickly turned into a real challenge to my staying power. I discovered that, contrary to the advertisements, database management programs won't change your life. They'll hardly make a dent in it, unless you have huge files of information that need managing.

You should keep a few things in mind as I explore these programs. The first is that power breeds complexity. The more flexible a program is, the more power it has. However, flexibility in these programs comes at the expense of having more options and user-defined operations. A program that I label as fairly simple to use is also probably not very flexible. Conversely, I'll write about programs that have tremendous power and flexibility.

You're reading between the lines correctly if you conclude that I'm also saying those programs are more difficult to learn and use. The most powerful of the group have almost complete flexibility—and a language all their own—and are very complex. Programming in these programs is like programming in any language. It takes work, practice and debugging.

**Familiarity Breeds Contempt**

Another thing you should understand is that I bring a rather jaded view to this series of reviews. I've had to eat, sleep and breathe these programs for the last few months. Familiarity breeds contempt. I've formed some strong opinions about them. My opinions will undoubtedly be apparent as you read through these reviews, but I want to share my prejudices with you now, before you read the reviews, so you'll be able to put my remarks in perspective.

Of the big four programs, I enjoy KnowledgeMan the most. To my mind, it satisfies several requirements that the others don't. First, I love the ability to program with colors that are software controlled. Secondly, KnowledgeMan offers spreadsheet and number-handling abilities that are unmatched by the other programs. This is a plus not to be weighed lightly. Thirdly, KnowledgeMan ap-

pears to be of the "one and only program you ever have to buy" variety. Along with spreadsheet, database and number crunching, you get forms painting, an editor and, soon, graphics. For the price tag, KnowledgeMan offers more than the rest.

I'm torn between all four menu-driven programs. ResQ has some nice features that make it ideal for businessmen. Data Base Manager II is also a nice program. Its report writing features aren't as fancy as ResQ's, but the ability to work with dBase II, 1-2-3, Multiplan and VisiCalc can't be overlooked. CIP sets a new standard for ease of use with its visual orientation and, last but not least, Aura, as an integrated package, offers features not available with any of the others.

My first choice is Data Base Manager II because it works so well with the other programs I use every day, but the other programs also offer features I like, so you should plan on looking at all the available programs to choose the one that best suits your needs and temperament. Each has strengths and weaknesses, but, on balance, all do very well at managing information; that's what they're paid to do.

### Terminology

One of the things you have to adjust to with a database manager is the language that accompanies it. For example, you'll hear about relations, tables, domains, pictures and files. The language of database management is fraught with jargon, but that jargon *does* convey information about the program with which you're working.

A relation is a combination of related fields of data. A table is the same thing. Domains are the types of data that may be placed in a field. A file can be either a collection of relations or tables or just a single one. Pictures are the way you want data to look when it's displayed or captured. These and other terms make learning the language of your program as crucial as learning the program itself.

When you finally take the plunge and purchase a database manager (and I have no doubt that most of you will), please take the time to learn it well. Few programs require so much of you. Few programs offer so much to their master. Few programs are so little mastered.

## R:base

Microrim, Inc.
1750 112th St., NE
Bellevue, WA 98004
Price: $495

## R:base: R Choice for Speed

Microrim's database management program, R:base, is a heavyweight database manager. One of the advertisements for R:base pictures a fish and states that Microrim was responsible for programming an information system for the U.S. Department of Fisheries. This beast is neither fish nor fowl. It's a fast-moving, powerful and intelligent information manager that fills the bill for almost anyone needing a database management program.

### Use It and Learn

The R:base manual is an IBM-sized affair broken down into major subject categories common to most database management programs. The manual is refreshingly well-done and has sufficient information to answer almost any question you have about using the program. The real documentation, however, is in the interactive disk-based tutorial. The people at Microrim obviously realize that the best way to learn a database management program is to use it. The tutorial takes you several hours to complete, and you'll probably want to repeat it a couple of times before you'll feel comfortable with the program. When you're comfortable with the operations detailed in the tutorial, you'll be a reasonably proficient user of R:base. I can't imagine many situations where you'll need to go to the manual if you've become proficient with the tutorial lessons.

In documentation, R:base is the best of the command-driven group of programs. You get two manuals. The largest is the reference manual, complemented by a smaller, paperback tutorial manual.

The reference manual makes good use of white space and graphics, and the typesetting job emphasizes important matters with oversized, darker print. The manual has convenient tabs that make finding information easy. The table of contents and the index both give ample information about what's in the manual and where to find it.

The tutorial manual is written in a light style that makes working through this section more like exploration than drudgery. The tutorial also progresses naturally from simple to more complex concepts, covering all important subjects. Other database management program writers can learn from Microrim's style.

While there are still a few spots in the documentation that could be improved, an instance of confusing or misleading information is the exception, not the rule. I commend Microrim for a job well done.

### Two Disk Address

R:base lives on two disks. The first disk contains the actual program; the second disk holds overlays, which must remain on-line in the default drive while you are actually using the program. These overlays include the help and prompt files that assist you with the program as needed.

R:base requires a minimum of 256KB of memory and two double-sided floppy drives. This use of a large amount of memory is one of the ways R:base gains its speed advantage. The more memory a program like this uses, the better (within reasonable limits, of course). Disk access time is cut remarkably when files are sorted all at once in memory rather than in pieces taken from and written back to disk.

R:base will work on a fixed disk if you have one. The program is not copy protected so it's simple to copy the program and overlay files to your fixed disk. This results in even faster response times and additional mass storage, although you'll probably never even come close to the theoretical limits imposed on R:base.

R:base allows you to define up to 40 files and to have up to 400 fields in each database. Maximum record length in R:base is 1530 characters. The theoretical limits on R:base include 2.5 billion records per file and 100 billion records per database. Obviously, you'll run out of hardware room long before you'll run out of software capacity.

While operating R:base, two separate help systems are available that make data entry and retrieval easier. First is a complete on-line help facility that has answers to most of the

questions you may have about the various commands used by R:base. The second, and more interesting, help facility is a prompt mode of operation. When you place R:base in the prompt mode, the program asks (prompts) you for the responses needed to execute the command you've selected. For example, if you give the computer the command "Prompt select," a screen appears telling you what the Select command does; you're prompted to fill in blanks for name of relation, attribute name, what attribute you wish to sort on, and what criteria must be met to select a record for sorting. Prompting is available for all R:base commands.

The command syntax used by R:base is similar to that used in other database management programs available on large and small computer systems today. R:base uses the terms relation and attribute to describe the way records are saved. Attributes are the fields of a record. They correspond to the columns on a spreadsheet. Relations are the umbrellas that cover various attributes. Under the umbrella Payroll Data, you might find the attributes salary, Social Security number and name. Under the relation Personnel Data, you might find name, address, Social Security number and date hired.

Notice that the two different relations can share attributes (name and Social Security number in this example). This is the beauty of a relational database system. You define all the attributes you'll need once and then create relations that use only those attributes you actually need for a particular application. Meanwhile, data is entered only once because relations share attributes. Records in R:base correspond to the rows in a spreadsheet. Now that the semantics are out of the way, let's move on.

The first thing you'll notice about R:base is its speed. Individual record searches result in an almost immediate response. Sorts of a data file are equally swift, with the sorted data appearing quickly after the sort is requested. Compared to other programs, R:base is one of the swiftest around (thanks to its use of large blocks of memory).

R:base uses a command language that allows you to create a relational database management system. This means that it takes an investment in time and effort to learn to exploit the capabilities of this program. Microrim has done its best to make this investment worthwhile and pleasant, but don't be deceived into thinking you'll sit down and tame this program overnight. As with the other full-fledged database management programs, R:base is still a challenge to learn and even more of a challenge to learn to use well.

The first thing you'll notice about R:base is its speed—the program is one of the swiftest around.

### Talking to Other Programs

R:base allows you to convert files from ASCII to R:base format. The method is simple. You use the command "LOAD 'Relation name' from 'File name' as ASCII". As long as your target file attributes match the attributes in the file you're loading from, the data will be transferred without mishap. I transferred many ASCII files back and forth as I worked on these reviews, and this feature seems to work well in all the programs.

R:base also uses the Multiplan Sylk-formatted files. Data from a Multiplan file can be transferred to R:base without incident. However, the interface with DIF files isn't up to standard, and the documentation makes it worse. The manual contains a description of how DIF files are organized and some instructions on using the report writer to convert DIF files to R:base files. What is really needed is the same type of assistance as with the Multiplan files: a simple command to convert from DIF format to R:base format; nothing more, nothing less. If I want to learn about the internal structure of DIF files, I'll read the Software Arts material on the subject. In the meantime, I just want to move my data around with a minimum of fuss and bother.

If you want to create forms for data input, R:base has designed a "what you see is what you get" system for getting a form set up. Entering the command Forms takes you to a screen editor—you type onto the screen the form just as you want it to appear. When that's completed, the program prompts you for the data it thinks you want to input on this screen. You reply yes or no to each prompt. If you say yes, the program then asks you for the start and end locations of the relation for which you wish to gather data. You start the entry area with an "S". The program immediately moves the cursor the number of spaces that are taken up by the field. You may shorten the entry field or leave it as is.

All of this design is done by drawing on the screen. This makes it much easier than using a coordinate system to place data elements on the screen. It's more natural and you see immediately what the screen looks like.

R:base also uses the special IBM character set. This character set lets you draw boxes and other special forms and designs on the screen. These forms can then be saved along with the data files and used for data entry. The only thing missing is a better explanation of how you can use the IBM special character set. Rather than put directions in the manual in simple English, you're referred to the IBM manual "Appendix C: 'Of Characters, Keystrokes and Colors.'"

That is unfortunate because it's a reference to the *Technical Reference Manual*, which many IBM PC owners may not own (it doesn't come as part of the package when you purchase the IBM PC). Appendix C in the *Technical Reference Manual* has the appropriate information but with no explanation of how to implement the actual characters. While R:base gets a kudo for providing you with a way to use the special character set on the IBM, Microrim needs to make the explanation on how to do so part of its manual, and not in the terms used by IBM's ambiguous *Technical Reference Manual*.

The report generator used by R:base is much like the forms generator. The report program is invoked with the Report command. While in Report mode, the program lets you define new variables and perform arithmetic calculations on existing attributes. When all of the variables and attributes to be used by a report are designated, the program then lets you draw the report on the screen. You're limited to a 132-character width on a report and ten variables. Within these limits, the creation of a report is fairly simple. The draw-on-the-screen feature is helpful here just as it is in the

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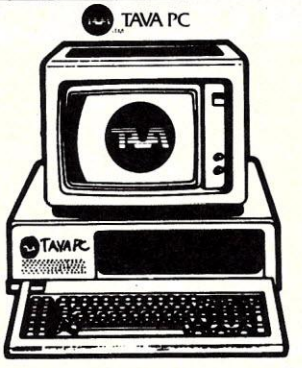
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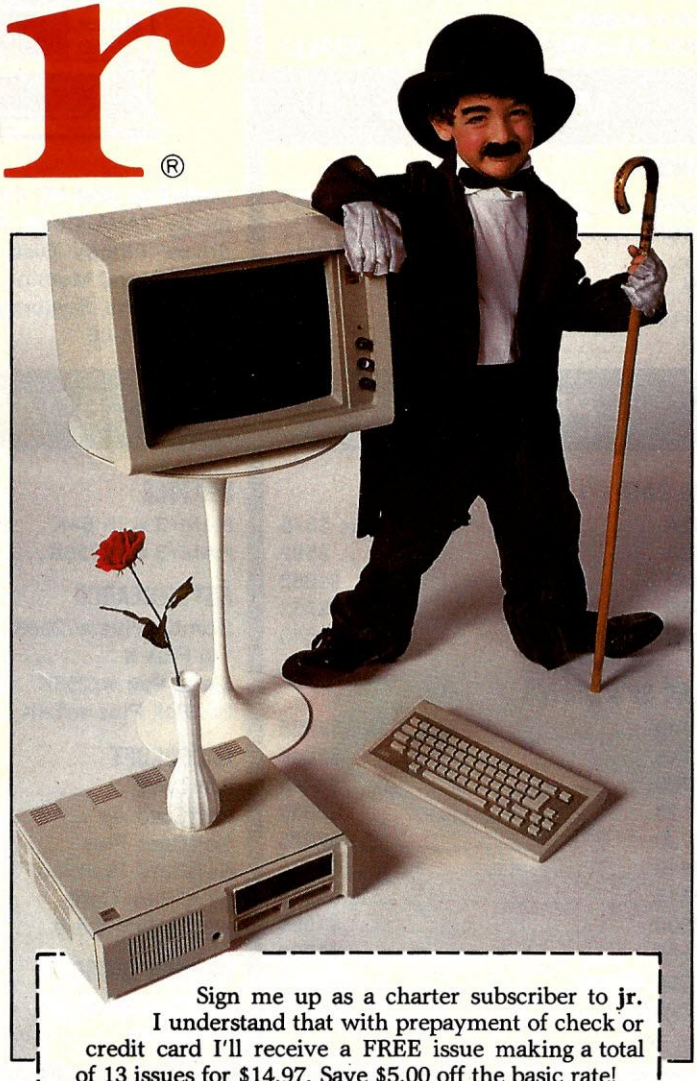
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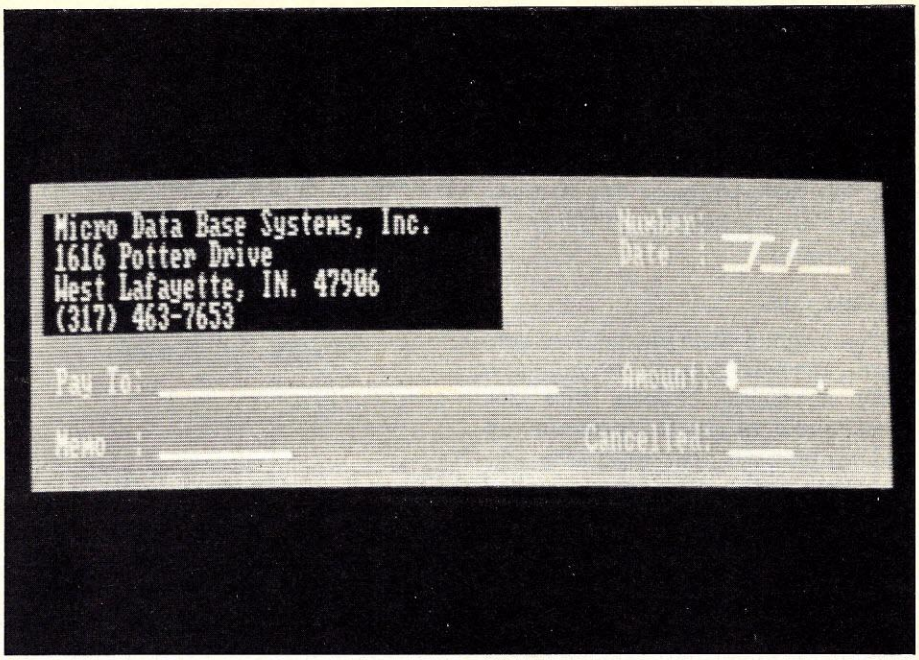
screen design part of the program.

R:base allows you to create command and prompt files to automate some of the database management actions you do repetitively or to assist you in creating custom applications for special situations. For example, using prompt files, you can create an accounting system that asks for the required entries for a specific business. Then you can create a command file that can be run at the end of each day to post the new entries to the various accounts, updating receivables, payables and general ledger, all with a single command.

A command file consists of the commands used by R:base placed in the order in which they are normally executed in an ASCII file. This file can be created with a word processor or with Redit, an editor supplied with R:base, or by using any other method that creates ASCII files. When the file is completed and saved, it's invoked using the Input command. R:base then does exactly what the file tells it to do, just as if the commands were being typed from the keyboard.

R:base has an even more interesting feature in the prompt files or menus. I've described the prompt system used by R:base earlier. You can create your own prompt menus just like the ones used to prompt you through the program. Using this feature, an innovative systems designer can create a complicated data entry system that is self-documenting. As a person starts out with the system, he can use the prompt mode to assist with data entry. As the person becomes more experienced, the prompt mode can be eliminated. It's still available at the touch of a key or two, however, for those situations where a procedure is seldom used or is especially complicated and help is required. The only limitation is that a prompted entry can be no longer than 80 characters, and there can be no more than 102 entries in a prompt file.

This section of the documentation could be clearer. The instructions for creating prompt files and running the program that actually creates the binary prompt file aren't up to Microrim standards. It may be argued that this is a technical feature of the program to be used only by experienced people. In my opinion, nothing in the manual should assume anything about the user's experience, except his ability to read and follow instructions. Even that is a dangerous, but necessary, assumption.




*With KnowledgeMan, you can design data entry screens that resemble their real-world counterparts. This screen was designed to look like a check.*

### Good Rating

R:base is a well-documented program with exceptional speed. It has many nice features and the support offered by the Microrim people seems to be excellent. I can recommend this program without reservation. It's best suited to handle large databases where its speed gives it a definite edge over some of the other programs. R:base offers a good deal of power and flexibility for the money. It's a better buy than dBase II and is appreciably faster. It integrates well with mainframes. In short, R:base is good program.

## KnowledgeMan

Micro Data Base Systems, Inc.
PO Box 248
Lafayette, IN 47902
Price: $500

## The Knowledge Manager

It's difficult to know whether to categorize KnowledgeMan as a database management package or an integrated software package. It's probably more of a database manager now, but with the add-ons that are being announced, KnowledgeMan will soon be the only program you need to buy.

The advertisements for KnowledgeMan show a fist coming down on a keyboard with a hand ready to intercept the blow. This obviously refers to a dBase II advertisement. The caption tells you not to take it out on your computer, the implication being that KnowledgeMan is more powerful than dBase II. I can vouch for the fact that the implied power of KnowledgeMan is, in fact, real. This program is an incredible powerhouse. It seems to beg for a problem to crush with its power. In the process, it draws you into its grip and your fascination with the raw power of this program soon overwhelms you.

### Choice of Bars

KnowledgeMan's documentation is better in some ways than I expected. The manual has a usable index, and it's broken down into subject areas that make sense. A coding system is used to break material into difficulty levels. A page with no bar down the side is level I for the beginner. A thin bar denotes level II, or intermediate material, and a thick bar denotes level III, or most advanced material. You know at a glance just what you're getting into.

The KnowledgeMan manual suggests that the beginner should read only those pages with no bars down the side, while the expert should read all of the material. I'm not sure that this advice is particularly helpful because it results in a lot of page flipping. At the same time, it's helpful to

know, when you're reading the material, what level that material is directed at in the writer's opinion. While a novice may not have difficulty understanding some of the advanced material, it's helpful to know that at least the programmers felt that the material was advanced. It gives you fair warning.

### No Samples

The original KnowledgeMan program I received some time ago had a fairly confusing chapter that discussed how to get the program up and running on your particular system. That chapter has been replaced with a beginner's manual that does a much better job of explaining how to get started with KnowledgeMan. The learner's manual is intended to be an introductory course in KnowledgeMan that is then supplemented by the manual. What's really missing are sample application programs using KnowledgeMan. The examples provided give you a feel for how the language works, but a couple of examples showing typical applications would do wonders for bringing some of the more complex and obscure elements of the language into perspective. An interactive tutorial and an on-line help facility would be marvelous additions.

### Custom Capable

The first step in getting KnowledgeMan running is going through the installation procedure. There's a nice feature available here: A memory manager is available on disk that will place as much of KnowledgeMan and its overlay files together as will fit in the memory on your machine.

> The ability to customize KnowledgeMan is unique and speaks highly of the thought that went into the programs' design.

What you will end up with is a new version of KnowledgeMan with the overlay files built in. The program now resides in memory. The more overlays that are in memory with the program, the faster the program runs. You can be selective as to what is placed in memory. If you plan on doing a lot of spreadsheet work, the spreadsheet overlay can be placed in memory (also the sort overlay or the define overlay).

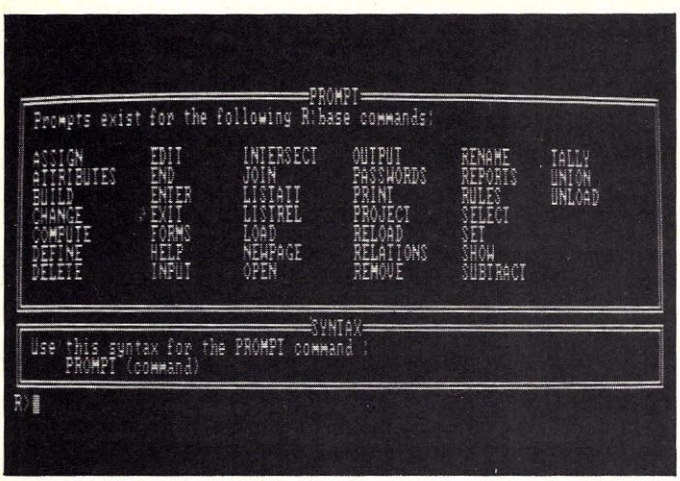
This ability to customize KnowledgeMan is unique and speaks highly of the thought that went into the program's design. The user is given every consideration when it comes to building a program that suits a particular need, which is nice to know when you're shopping for database packages.

Another example of the orientation of Micro Data Base Systems (MDBS) is found in KnowledgeMan's use of color. You have many options for designing color into your input and output screens. The spreadsheet also uses color. Since the color attributes are under software, not hardware, control, you can build forms that "speak" to you in color. A negative number on a spreadsheet can be displayed in red. Critical areas can be highlighted in yellow until they're successfully completed. Input cells can be highlighted in color. Any number of uses for color are possible, limited only by your imagination.

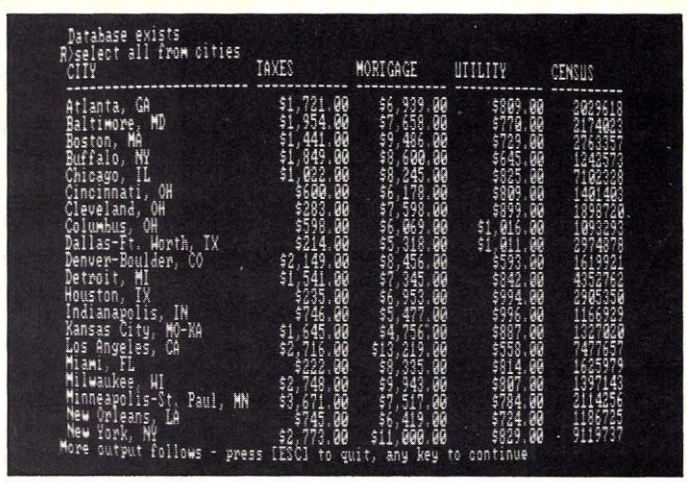
One thing you'll discover is that KnowledgeMan allows you to make full use of all 40 possible function key assignments. The keys are predefined, but a utility allows you to redefine them to your liking. This is especially helpful to someone setting up a custom application. By judicious use of the function keys, a completely automated system can be designed that isolates the system from the product, ensuring that even a first-time user can get the job done. This is ideal for custom applications since a series of program activities can be called by one keystroke.

Speaking of custom applications, the people at MDBS have anticipated that people may be interested in building applications from KnowledgeMan. They offer a run-time version of KnowledgeMan for program developers. This will permit the development community to take advantage of the power of KnowledgeMan and still allow MDBS to offer a competitively priced product.

One section of the manual that needs more work is the printer interface and reports documentation. The creation of reports on paper has to be a primary use of a database management system for many people. KnowledgeMan doesn't offer a lot of help in designing reports. This should be




*This R:base help screen is for the Prompt command.*




*A quick-and-dirty R:base report.*

rectified with the new on-screen forms painting feature, but I'd like to see MDBS improve the KnowledgeMan documentation here. As an example of the problem, the documentation details printer open and close strings that don't serve any useful purpose I can detect. The program does allow you to send ASCII codes to the printer using a CHR function, but this feature isn't highlighted, nor are examples of how to use it given. The earlier versions of the program didn't even offer this much, however, so I suppose I shouldn't complain.

KnowledgeMan offers a great deal of flexibility in protecting your data from unauthorized use. The data files are encrypted automatically. Read and write password protection is offered down to the field level. If security isn't a concern, the password protection utility can be left off the operating system disk.

KnowledgeMan offers complete flexibility in formatting the appearance of data as you enter it. The program will automatically edit information you enter based upon pictures you've defined for the data fields.

The environmental variables also offer numerous formatting options, such as foreground and background color, the location of error messages on the screen and the display of various statistical functions built into the program.

KnowledgeMan has a complete set of numeric and string functions built into the program. In this respect, KnowledgeMan is equal or superior to other database management systems. A listing of the functions is found in Table 1.

## Real Joy

KnowledgeMan uses a command language similar to IBM's SQL/DS mainframe database management language for data query functions. This language uses commands that are as close to plain English as possible. Generally, the meaning of the commands is obvious.

If all that sounds rather complicated, it is. It will conservatively take you weeks to become proficient with the most rudimentary capabilities of this program. To become really proficient, you should anticipate spending many long hours exploring the intricacies of KnowledgeMan. This exploration won't go unrewarded. KnowledgeMan has the ability to handle multiple files and lengthy records with ease. For instance, KnowledgeMan can have a maximum of 65,532 records; each record can have 65,535 fields; and each field can support 65,535 characters.

To become really proficient, you should anticipate spending many long hours exploring the intricacies of KnowledgeMan.

One of the things that makes KnowledgeMan infinitely more powerful than dBase II and other similar database management systems is its ability to handle numbers. This ability is best demonstrated by the number of numeric functions available and by the fact that KnowledgeMan contains a spreadsheet. The commands available with this spreadsheet include all of the normal spreadsheet commands and, in addition, all of the file management commands used in KnowledgeMan. What this means is that you can extract data from your database and automatically load it to your spreadsheet. You can perform the normal kinds of spreadsheet analysis on that data and then put it back into the database.

**Numeric Functions**

ABS
ARCSIN
CURREC
EXP
LEN
LN
LOG
LOOKUP
MATCH
MAX
MIN
RAND
ROOT
SIN
SUM
SQRT
TONUM
TRUNC

**String Functions**

LOCASE
SUBSTR
TOSTR
TRIM
TYPE
UPCASE

**Logical Functions**

EOT
FILEX
ISALPHA
ISDIGIT

*Table 1. KnowledgeMan functions.*

The pleasure of using a spreadsheet is greatly enhanced when you don't have to use a utility program to convert all of the data you just typed into your database. The sorting and selecting capabilities of the database make it easy to extract only the information you wish to manipulate for the spreadsheet.

Unique to KnowledgeMan is the ability to enter data to the spreadsheet even while you're in the database management mode of the program. While you can't see it happening, when you return to your spreadsheet from the database, you'll find the information you sent to it just sitting there waiting for you to work with it. When you've completed your analysis of the material, you can put it back into the database, all without changing disks or reloading a program. It's a real joy to be able to do this type of data swapping when you've lived for years with the hassle of swapping program and data disks.

The type of application that comes to mind immediately for this program is as a decision support system. The functions that are built in, along with the spreadsheet ability and statistical capability, make this program a natural for this type of application.

## S = UF

A formula I keep in mind when I evaluate software is speed equals user friendly. This little equation has proven true over and over again. If a program is slow in execution, you'll quickly tire of waiting for your computer. KnowledgeMan is written in assembler and C. As a result, it runs fast. The addition of the memory manager has sped things up even more. But remember that data manipulation time is only part of the speed equation. The speed with which you can go back and forth from function to function, and the speed with which

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you can get an application up and running, are also crucial. Also important is the fact that much of your work can be done without ever leaving KnowledgeMan because the spreadsheet is built in. This speeds things up even more.

### Down the Road

MDBS software has big plans for KnowledgeMan. Enhancements to be offered in the near future include a text editor and a graphics management package. These two programs will be integrated with the KnowledgeMan program. This will provide business users with a much more usable package. I hope to bring you an updated review of KnowledgeMan when the graphics, editor and forms painting features are available.

MDBS is also planning training seminars, and several publishers have expressed interest in writing educational books on the program. If MDBS builds up a sufficient base of interest in this program, the user support program bodes well for the people who purchase KnowledgeMan.

Speaking of support, the people at MDBS have a real commitment to support the program. I called several times and was impressed with the willingness of the support people to talk about problems. If they're busy when you call, leave your name and number and they'll call you back.

### Vermont Capital

To try to sound out the claims about this program, I decided to build a database that one might not normally consider for a micro. I decided to put up a system to track the capital budget for the state of Vermont. Other methods for tracking this information were available, including an IBM 4300 series computer. The real test would be whether there was enough power and flexibility to track this kind of data.

The original records in this database contain historical and current financial data. Added on as time passed were narrative remarks, priority rankings and tracking information on the various versions of a bill as it made its way through the legislative process. The database grew to more than 200 separate capital requests and each record grew close to 200KB.

As it turns out, this system is considerably more flexible than anything previously available. Especially helpful is the ability to dump selected data fields from the database to the spreadsheet for financial analysis and then to be able to update the records to the file from the spreadsheet.

If I were trying to do it on a mainframe, this database would probably never have been created. The need for quick and easy interactive query capabilities and quick report generation give KnowledgeMan the edge over mainframes. The ability of KnowledgeMan to convert files to ASCII, DIF or Basic format also proved useful. I could quickly transfer data from KnowledgeMan to Lotus 1-2-3 for additional spreadsheet and graphics analysis. I expect that when the graphics package KGraph is available, I might not even need 1-2-3.

### Adds Up Well

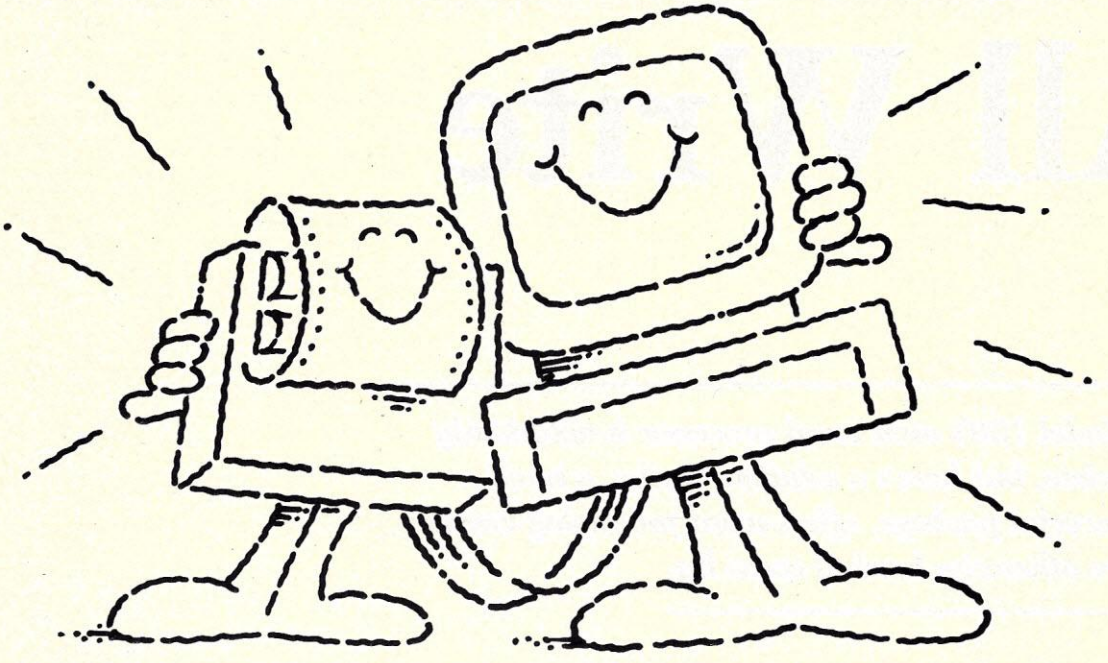
KnowledgeMan may well be the only program you ever need to buy. The capability built into it for handling numbers, graphics, text, forms and data make it one of the most powerful microcomputer programs available today. However, this power isn't gained without cost in ease of use and in difficulty in learning to use it well, but KnowledgeMan sets a new standard for database management programs that no other manufacturer has yet rivaled.

If you own a 16-bit system and have serious database management problems, KnowledgeMan has one of the best price/performance ratios of any of the programs available anywhere today. Furthermore, the support offered by MDBS makes those difficult problems you can't solve a thing of the past. A user-supported base of information about this program should begin to develop, and MDBS plans a tutorial-type manual for the program to supplement the existing manual. All these things add up to a powerful, flexible, exciting program that will be around for some time to come.■

*This is the first of Shawn Bryan's three-part database review. Next month, Bryan will look at dBase II, Condor 3 and Data Base Manager II. August's critiques will include Concentric Information Processor, ResQ and Aura as well as a comprehensive chart detailing the pluses and minuses of each package. Stay tuned!*

*Address correspondence to Shawn Bryan, Montpelier Junction, Montpelier, VT 05602.*

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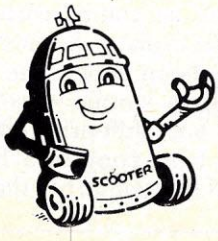
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# Scribe: All Write

***The Model 100's own word processor is notoriously incomplete, but here's a solution. Scribe, a small but powerful package, offers word processing luxuries that are otherwise hard to come by.***

By Eric Grevstad
Senior Writer



*Scribe is designed to enhance the Model 100's word processing features.*

There are two landmark machines in mobile computing: the Osborne 1 was transportable and came with bundled software; the TRS-80 Model 100 is truly portable and comes with built-in software. Except for a spreadsheet, Radio Shack's briefcase micro has almost everything most users will ever want. For example, several firms are hawking Model 100 appointment and calendar programs, but only spendthrifts would use them instead of Tandy's own Schedl.

There's an exception, however. Text, the portable's word processor, is fine as long as you're uploading documents to a desktop, but it's poor at putting words on paper. The 100's print key gives a simple 40-column screen dump and shift-print offers a single-spaced hard copy of a file in your choice of line width, but that's it.

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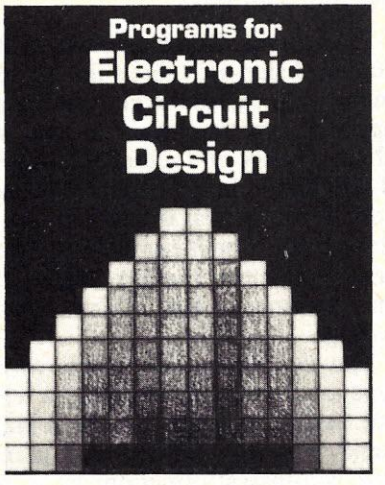
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With Scribe, you can specify any number of salutations other than the addressee's name. A letter to Jane Doe might begin "Dear Ms. Doe," "Dear Jane," or "Dear Bootsie."

To get luxuries like double spacing or justified or centered text, half a dozen firms have written print formatting programs. They're not fancy—basically LPrint statements beneath layers of bells and whistles—but a good one can turn the 100 into a stand-alone word processor. Scribe, which not only handles printing chores but supports form letters and mail merging, is one of the best.

**Small Program, Big Features**

Loaded from tape into RAM, Scribe fills a modest 3427 bytes; it takes another 2KB or so of free space to run. That should leave plenty of room for your text, but the program can print cassette as well as RAM files (reading one line from tape at a time) if you're long-winded. It can also turn your printer into a typewriter, printing a line each time you press the enter key.

Dot matrix owners will delight in Scribe's opening menu. It lets you choose pica, elite or micro type (ten, 12 or 17 characters per inch), and double strike, emphasized, both or normal (i.e., daisy-wheel) printing. You can also specify single, double or other line spacing, the first page number, the number of copies to print and a pause between pages (if you're feeding a single-sheet printer). The default values (pica type, single spacing and so on) will satisfy lazy users.

The menu, plus Scribe's defaults for margin widths and right justification, allows you to produce attractive printouts of perfectly standard text files. The real strength of the program, though, lies in its embedded commands, which you'll want to sprinkle through documents as soon as you master the easy mnemonics: Instructions like .tm or .lm, set on a line by themselves (multiple commands can be joined by semicolons), let you change formats (for example, the top and left margins).

Besides altering margins and line length, you can indent text, skip or center a line or number of lines, start a new page, turn on or off right justification, switch to double-width printing (on a dot matrix) or send printer control codes for things like underlining and subscripts. In fact, you can do almost anything except change line spacing or use the tab key instead of the space bar to indent paragraphs—though it's six spaces on paper, Scribe counts the 100's tab as only one character, so lines poke out past the right margin.

**Playing with Files**

If you end different letters with a standard sign-off, there's the .ap command—.ap closes the current file and appends another one, so you can chain a series of documents together. If you like to insert personal notes in your form letters, there's .ke, which stops normal printing while the printer-as-typewriter feature takes over and resumes when you've finished typing.

The .ke command is a fine way to type an address at the top of a letter, but Scribe provides a more sophisticated alternative: The N&A (names and addresses) function is a full-fledged mail merge program that reads names, addresses and salutations from an auxiliary text file and prints them atop multiple copies of a form letter. You can even specify a salutation other than the addressee's name; a letter to Jane Doe might begin "Dear Ms. Doe," "Dear Jane," or "Dear Bootsie."

Each record in your N&A file must contain an alphanumeric code (if it doesn't, Scribe won't read it)—if you specify the code when printing, you can send letters to only selected people in the file. Menu options provide for printing envelopes, labels and letters and for reviewing files.

The addressee's phone number (not printed) is the second entry in each record, which is what the Model 100 expects of ADRS.DO. Give that name to a Scribe N&A file and it can be read by the quick-find and autodial functions of the TRS-80's Addrss and Telcom programs.

**Any Problems?**

Clearly, Scribe is as versatile a program as Model 100 writers could want. Unless you write very long documents on your 100 (which is unlikely), you won't even mind that Scribe's LPrint routines make it a little slow, especially when justifying text. Similarly, the pause for single-page printers is awkward—you not only have to insert the next sheet, but enter a value for the top margin—but bearable.

I have a more serious reservation about my review copy of Scribe, which was a pre-release edition of the N&A version: Three features mentioned in the manual didn't work. Scribe is supposed to number pages, beginning with the second, and to allow a title or header at top and a stamp of the filename, date and time at the bottom of each page. My copy produced perfect text but no extras.

When I phoned Chattanooga Systems Associates, not only did manager Ray Hoskins promise to catch those bugs in retail versions, but he said his latest upgrade allows output to an RS-232C interface or other devices as well as parallel printers. It also has a trimmer menu and lets you alter line spacing within text. Since I occasionally single-space quotations within double-spaced manuscripts, that takes care of my last complaint.

Even with fixed spacing, Scribe is an excellent choice for anyone who plans to hook a Model 100 to a printer. Its formatting commands, coupled with its choice of regular, tape, keyboard or form letter file input, make it a tremendous value at $39.50; if you can live without the N&A feature, there's a slightly smaller (2.3KB) version for $10 less.■

**System Requirements:** TRS-80 Model 100 or NEC PC-8021A; 16KB RAM; cassette.
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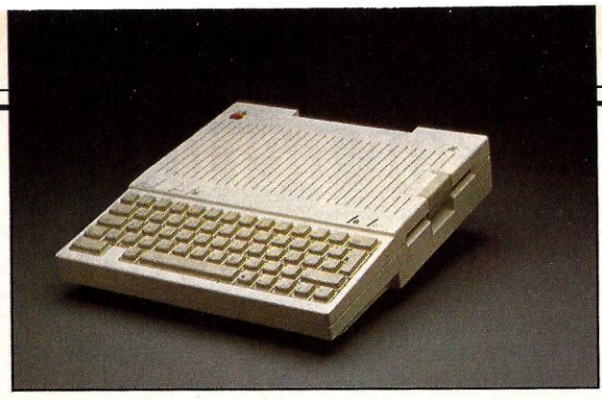
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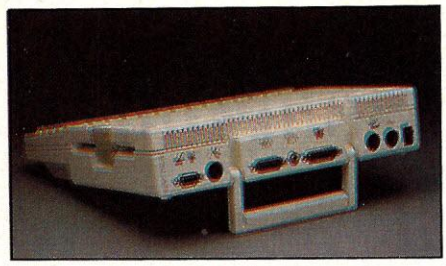
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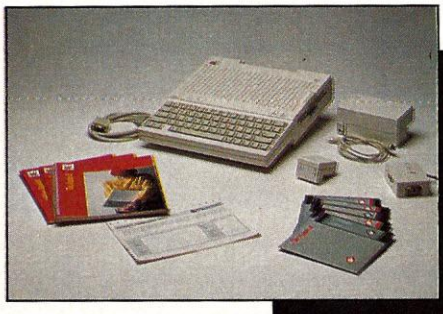
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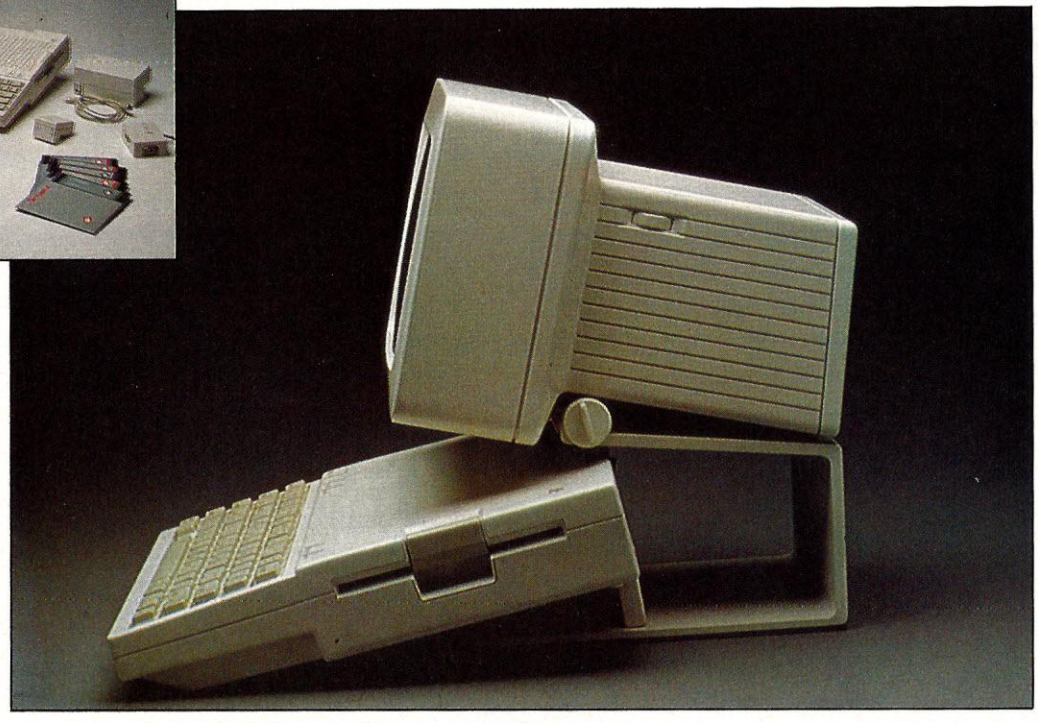



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# Apple Goes IIc

*The introduction of the IIc certainly wipes out any doubt as to Apple's commitment to the II family of products. This month, we review Apple's first portable.*

By Keith Thompson
Editor-in-Chief

Also known as Jason, Elf, Lolly, IIp and many other code names during its 18-month inception period, Apple's new portable has simply been christened the IIc.

Apple Computer, Inc.'s adamant defense of its Apple II product's future was due to concern among the large base of II manufacturers and users that its machine might be forsaken for the splashy Lisa/Macintosh machines.

Any doubt of Apple's continuing commitment to the II family of products disappeared with the introduction of the IIc in April. The IIc marks a radical departure for Apple from the IIe. With significant technical enhancements, the IIc is aimed at a mass consumer audience.

Don't be too quick, though, to think

of replacing your IIe with a IIc. Strong points in each machine suggest that they'll coexist for quite some time.

### New Design

Although the IIc operates like an Apple II, its design is completely new to the Apple family. Apple wanted a small machine, one that would fit into a briefcase. This machine must be easily toted between home and work and also quickly moved around within a single environment.

The IIc is light (7½ pounds) and portable, due to its convenient handle and minimum number of interconnecting cables. The IIc is the first portable to incorporate an internal 5¼-inch disk drive, which is situated along the right side of the IIc. Redesign of the door allows equally simple disk access from the front or side of the machine. To open the drive door, you merely press the button mechanism that wraps around the side and top of the drive opening.

The IIc design concepts will be used for all Apple products in coming years. Apple retained the services of Hartman Eslinger, the same industrial designer who designed the Sony Walkman and Sony Profeel TV to give a unique look and feel to the IIc and subsequent Apple products.

The goal was to make a machine that didn't intimidate and that did allow the user to relate to it—even to the texture of the IIc, which imitates skin texture. Apple Fog and Snow Beige (Apple beige with less yellow) are the new colors, chosen for their clean looks and environmental adaptability, rather than the traditional Apple beige.

The IIc also accommodates ergonomic features like a tilted keyboard with its angle optimized for easy typing. The handle, located at the rear of the machine, actually doubles as the tilter. When tilted, the machine ventilates properly either on a desk or on a carpet. This convection ventilation system replaces the need for any type of fan.

All switches (except the power switch) are visible from the top of the machine. The reset switch is on the left-hand side of the top of the case far away from an accidental mistype. Two less-used smaller switches are next to the reset switch. One switches between 40- and 80-column display and the other alternates the keyboard between Qwerty and Dvorak layouts.

Although the IIc operates like an Apple II, its design is completely new to the Apple family. The IIc design concepts will be used in all upcoming Apple products.

Symmetrically situated on the right side opposite the column and layout buttons are two button lookalikes that actually house LEDs. One LED indicates if the machine is on and the other indicates disk drive activity.

The power supply for the IIc is external—not the type that plugs directly into an outlet like a calculator but a small box that sits on the floor beneath the table. Ample cable allows you to position the supply so that it's out of the way. The power supply converts 110V ac to 15V dc. Apple engineers claim that the external supply, aside from saving space within the IIc, allows the development of alternate power supplies, such as automobile battery converters and external battery packs.

The only other external parts to the IIc, the rf modulators, allow you to connect the machine to a television set. Even these two small connection boxes are designed with aesthetic appeal.

### Low-Key Board

The keyboard of the IIc is an entirely redesigned low-profile board. Directly beneath the keys, a splash screen protects the board from dust and dirt. Beneath that, a rubber pad gives a quality feel to the board. There are 62 keys for data and text entry. The keyboard has a standard typewriter key layout that includes tab, delete and shift-lock keys (these were missing from the II Plus). All 128 ASCII character codes input through the keyboard. The board has four cursor keys in addition to the opened- and closed-Apple function keys (like those found on the IIe). No provision internally or externally is made for a numeric keypad.

My preview didn't allow time for any extended typing exercises. However, the keyboard has a firm tactile feel and an assuring audible click. The key-cap labels are an easy-to-read sans serif typeface from Europe called Univers 48.

The IIc also supports a mouse—the same mouse as the IIe computer—that connects to the joyport in the rear of the machine.

### The Displays

The IIc as packed in the box has no display of its own. The basic IIc package comes with an rf modulator that allows you to immediately plug into a standard television set. For uses other than games, though, alternate displays are necessary. The machine supports many different types of displays. Apple offers a design-coordinated monitor with a stand that allows the IIc to be snugged under it. The IIc also supports standard monochrome displays. In the fall, Apple will market an RGB monitor that connects to the machine.

The most compelling accessory for the IIc may well prove to be the promised LCD. This display (in prototype now) is a flat screen display that props up on top of the IIc when in use or flips down across the top for travel. The display is a full 24×80 (560×192 pixels). I'm told that the screen is fast, unlike most LCDs. Apple hopes to have the unit in quantity by the end of 1984. This option, and a battery pack, increases the portability of the IIc and opens up the IIc to another enormous market of potential users.

### What's Under the Hood?

The IIc comes in a small package, but inside is an impressive array of hardware. As the IIe reduced the IC (integrated circuit) count from the II Plus, so too, the IIc has a smaller chip count than the IIe. A chip-by-chip comparison is unfair because the IIc offers so much more in the way of built-ins than does the IIe.

Options that require cards in the II Plus are practically all built in to the IIc. The IIc is a closed machine with no slots. The top can't be opened without voiding the warranty. Apple

believes an open-topped machine might intimidate its target market. Apple also wanted to eliminate the inconsistencies inherent when you place different cards in different slots, often posing problems of compatibility and operation. However, most of the popular extras that the cards provide to IIe owners are built in to the IIc.

The insides of the IIc comprise four main sections: the half-high disk drive, the keyboard, the regulated power supply and the main circuit board. The disk drives, manufactured by Alps in Japan, are redesigned drives, built according to Apple's own specifications for compatibility with II disks and for size and cooling constraints.

Aztec makes the power supply. It takes 15V input from the external power transformer, supplies 18 watts continuous (30 watts surge) to the IIc and has built-in circuit protectors.

The entire computer is on one digital board. A 65C02 replaces the standard 6502 chip used on all previous Apple IIs. This CMOS chip is used for two reasons. First, it handles an additional 27 instruction sets and creates faster graphics and faster number crunching than the 6502. The second consideration is the reduced heat that the 65C02 generates compared to the 6502.

On the board are 128KB RAM and 16KB ROM. The bootstrap, Applesoft Basic and routines that support a mouse are within the ROM. Elsewhere, a built-in 80-column capability is switch or software selectable. The board contains a PROM that serves as disk controller for the internal drive as well as the optional external drive.

Servicing is done by replacing the entire board rather than individual components. All components (except for the ROM that changes with the international version) are hard-wired onto the board.

### Input/Output

The IIc is self-contained. In addition to the switches mentioned above, the lower bottom of the IIc has a volume control for the built-in speaker. The addition of a headphone jack with a Walkman-type miniplug is a desirable enhancement over previous IIs. This eliminates the distraction factor with some games. Incidentally, when the IIc is used with a television set, sound is now included in the rf modulator output. This was missing from II machines. Games are sure to sound much better (and louder!) with this addition.

> The premise of the IIc is to recreate the Apple II phenomenon. The IIc offers instant access to thousands of programs already on store shelves.

A compact row of I/O connections is in the rear. Some, as you'll note in the photo, are European-style din plugs. These are used primarily for space reasons and are also less vulnerable to rf problems when certifying compliance with the FCC. Unfortunately, they do introduce one more cabling problem. Each din has a different number of pins so that it can't be placed in the wrong socket.

Here is a listing of each connector:

1) Power (din). This connects the external power transformer.

2) Video Display (DB-15). The IIc can drive a number of different displays. This connector accepts the rf modulator box that comes with the IIc. Other plug configurations supply raw video outputs for either RGB or LCD displays. To provide for future technology, the IIc engineers brought both serial and digital video lines to this output.

3) Monochrome Display (standard RCA plug). Any standard monochrome display, including the optional IIc display, is driven from this socket.

4) Modem (din) and Printer (din). The IIc has the equivalent of two super serial cards built in. These ports can be configured with software to support a modem at different bit rates and different serial printer configurations.

Apple has apparently abandoned parallel printer support. Neither the Macintosh/Lisa group or the future Apple II group supports the industry standard parallel interface.

5) Joyport (DB-9). This plug is compatible with the IIe joyport. It supports the same group of products, notably joysticks, game paddles and the newly introduced Apple II mouse.

6) External Memory. This plug connects to the optional disk drive. It also connects to other mass storage devices, such as a hard disk, marketed by Apple or third party vendors.

### Compatibility

Yes, absolutely! Perhaps the greatest question for Apple, and certainly important for the consumer, is compatibility. Each generation of IIs is compatible with its predecessors but compatibility is more difficult as additional IIs are introduced. The problem is dichotomous: downward compatibility vs advancing technology. The task is keeping the present software base satisfied while advancing the technology in personal computers.

The transition from the II Plus to the IIe wasn't too difficult. External features particular to the II Plus have been slowly outmoded by the IIe in certain applications. Additional keys and graphics on the IIe are used by developers much more now that the number of IIes has grown over the past year and a half.

The IIc has improved on the IIe's performance rather than adding any new features. The 65C02 handles graphics faster.

Other less obvious changes are the mouse routines within ROM. Some programs on the IIs that used alternate character sets will, with the IIc, get mouse icons on the display rather than the alternate inverse display. Software developers are working to eliminate it on software produced from now on. Because of some internal differences with the 65C02 chip, some II software that employs certain protection schemes won't work—mostly schemes that were used some years ago.

The premise of the IIc, though, is to recreate the Apple II phenomenon. From a marketing standpoint, an important reason for considering a IIc is to have instant access to the tens of thousands of programs already on store shelves.

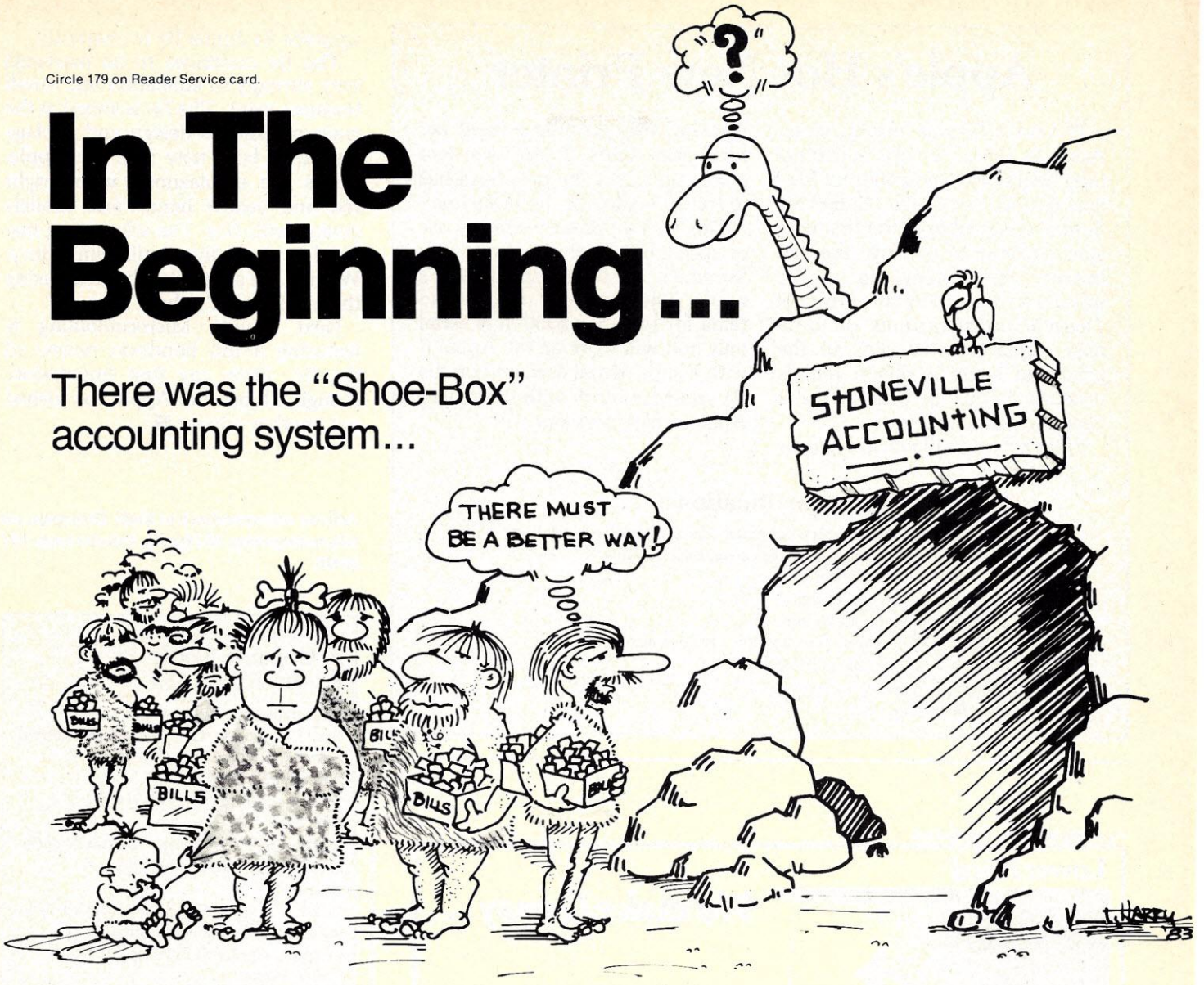
### Conclusions

Apple lives up to its promise to continue to support the Apple II. Although technology has passed the eight-bit world, this machine has undoubtedly found a secure place in the consumer market field. Whereas IBM chose to downgrade its IBM PC to create the PCjr, Apple chose to

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# Apple's Hot New Printer

When the IIc was introduced on April 24, 1984, it was accompanied by the first generation of low-cost dot matrix printers. Called the Scribe, this printer is the first consumer printer to employ "thermal transfer" technology—not to be mistaken for thermal printing! Thermal transfer prints on ordinary paper. Heated pins in the printhead strike a ribbon that is wax-based, this in turn leaves a character on the paper.

Ribbons are available in black or in color. One color is printed per head pass. Thus, if you want two colors on a line, the printhead has to travel twice over the same line.

This isn't a printer for heavy use or speed, but for its price and performance, it will meet many user's needs. The Scribe is expected to retail for less than $300. It is serial only and will work on the Apple II with a super serial card and on the IIc and Macintosh with the proper Apple cable accessory.

## Scribe Printer Specifications

**Print Method (black only):** dot matrix, limited logic seek printing
**Color:** dot matrix, four-color ribbon, no logic seeking
**Direction:** uni-directional
**Print Speeds:** 50 cps, 80 cps
**Print Throughput:** 20–25 lpm
**Graphics Throughput:** four minutes per page maximum
**Ribbon Type:** one pass, thermal transfer
**Handling:** disposable cartridge
**Interface:** serial only

upgrade its Apple IIe to create IIc.

The IIe continues to be marketed very strongly to education and small business users. The IIc is aimed at the mass market. Its design and packaging are a bold new step for Apple. Boxes are emblazoned with bright red and yellow bands and models posing with IIcs. The advertising material is markedly nondiscriminatory. Women are shown holding and using the machine—it's about time.

Next month, *Microcomputing* is featuring a full hands-on review of the IIc. From my first impression, though, I'll bet that Apple has turned out another winner.■

*Address correspondence to Keith Thompson, c/o Microcomputing, 80 Pine St., Peterborough, NH 03458.*

## A Capsule Look At the Apple IIc

**Manufacturer**
Apple Computer Co., Inc., 20525 Mariani Ave., Cupertino, CA 95014.
**Processor**
1 MHZ 65C02 eight-bit microprocessor.
**Keyboard**
63 keys (including reset), 128 ASCII codes, automatic repeat, two-key rollover.
**Memory**
128KB RAM, 16KB ROM (includes disassembler and machine language monitor program, Applesoft Basic and self-test).
**Video Display**
24×40-column text, 24×80-column text, 48×40 sixteen-color low-resolution graphics, 192×280 six-color high-resolution graphics, 192×560 sixteen-color double high-resolution graphics.
**Video Output**
75 Ohm, 1V RCA mini-plug for 14 MHz monochrome monitor. IIc comes with rf modulator for connection to television color.
**Disk Drives**
One internal 5¼-inch with 140KB capacity. Controller for additional external drive built in.
**Maximum Power Consumption**
31.5 W continuous.
**Available Software**
Almost all existing Apple IIe software.
**Approximate Prices**
Basic Unit (IIc, power transformer, rf modulator for television connection, program tutorial disks, operating manuals), $1300.
IIc monitor and stand, $250.
External disk drive, $400.
Additional power transformer, $30–40.
Carrying case, $40.
LCD flat panel display, $600 (late '84).

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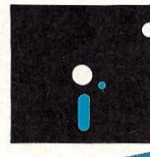
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One Japanese electronics giant, Sharp, has a reputation for producing equipment that's both innovative and reliable. Although well-known in Europe, Sharp has until now made little impact on the American micro market: Only the PC 1500 pocket computer has been widely available in the United States. Considering the position maintained for more than 18 months by the PC 1500, it isn't surprising that Sharp's latest portable marks a new breakthrough in this most competitive part of the rapidly changing computer market. The PC 5000 is a truly remarkable machine.

The term "portable" is frequently abused by the computer industry, whose advertising agencies seem to have little idea of what the word really means. Many of the machines claiming to be portable are *trans*portable rather than easy to carry, as the word portable implies. The PC 5000, although not a featherweight machine, is small enough to be conveniently carried from place to place. Its many facilities place it in a league that compares with the most recent desktop business micros. As a state-of-the-art machine, it's exceptionally difficult to review except to say that it's the best machine of its type and is likely to remain so for some time to come.

Sharp's latest portable marks a new breakthrough in the rapidly changing computer market. The PC 5000 is a truly remarkable machine.

### In the Box

Like the Gavilan, its hugely expensive competitor, the PC 5000 is one of a new breed of folding computers. The screen is held in the lid of the machine. This shuts down flat over the keyboard for ease in carrying and safety. Measuring 12 × 12½ × 3½-inches, the PC 5000 weighs a little more than 12 pounds, including a printer, an 80-character by eight-line LCD display screen and a 128KB non-volatile bubble memory cartridge. The whole package is neatly designed and, though not fitted with a handle, can be easily slotted into a small attache case.

At the heart of the system, a CMOS eight-bit CPU and an Intel 8088 16-bit CPU provide a processing environment that's directly compatible with the IBM PC. 192KB of CMOS ROM is divided up into 64KB for the operating system and 128KB for the DOS and Basic. There is 128KB of memory provided as standard. It is expandable to 192KB or 256KB if a 64KB RAM module is used to replace the Basic ROM module. Access to the ROM/RAM expansion sockets is easily gained by removing two screw-in panels on the base of the machine. The same sockets provide a facility for ROM-based software that is currently being prepared by a number of companies.

Internally, control support is provided for the printer, LCD display, keyboard and a small speaker. A real-time clock provides a number of sleep

# The PC 5000 How Sharp Is It?

*The term "portable computer" is frequently abused in this industry, but the Sharp PC 5000 is truly portable. The author used the machine in the office, on a train and on a plane—in this article he reports on how this long-awaited computer withstood the pressures of daily use.*

By Dominic Powlesland

and alarm facilities. The clock's on/off switch is provided on the base of the machine, and the clock must be set before the machine can be used.

A series of ports on the back of the machine provides for a number of peripherals and an ac adapter. Connectors for cassette cables link with an audio cassette interface to provide a transfer rate of 1000 bits per second (bps). An external bus driver provides for the connection of a dual minifloppy disk unit while other devices are catered to with an RS-232C interface socket and a serial interface for a dial-direct telephone modem and definable keypad.

The ac adapter, weighing another pound, provides a direct power supply from the mains as well as charging facilities for the lead acid battery (which provides up to eight hours of power away from the office). The lead acid battery has a longer life and shorter charging time and is lighter and more compact than a nicad battery of similar power. A simple clip connector links the battery and machine so replacement is an easy exercise. For those working in remote locations, spare batteries may be purchased as accessories.

The strongest selling point of this machine is the bubble memory facility. Its use pushes the machine to the forefront of the portable field

### Bubbles and Disks

Perhaps the strongest selling point of this machine for the scientist or executive on the move is the bubble memory facility. Bubble memory has had little publicity of late, and, though developed several years ago, has never been widely introduced: Its use in the PC 5000 instantly pushes the machine to the forefront of the portable field. Bubble memory units have no moving parts, are comparatively sturdy and win hands down against any sort of disk unit for mass storage on the move.

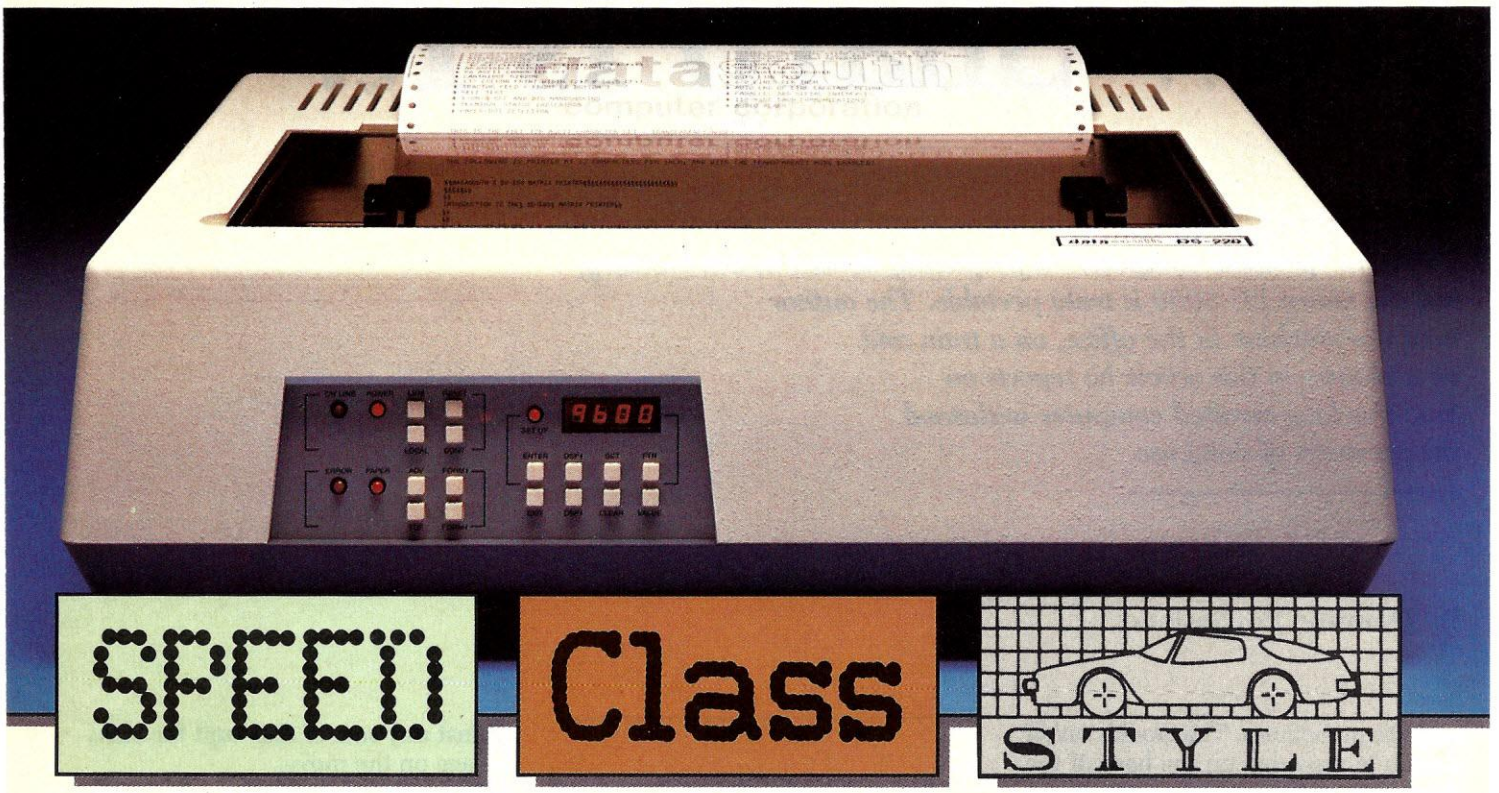
Not only are these units quite secure, they're also fast. The PC 5000 bubble unit, with 128KB capacity in a two-inch square package, functions in exactly the same way as a single disk system as far as the user is concerned. Two bubbles are addressed as A and B; external minifloppy disks, if attached, are addressed as C and D.

The bubble units, which are formatted during manufacture, store data in 512 byte sectors with eight sectors to a track. They can be write-protected by sticking a reflective label on one side. Sensitive to extreme temperatures, the cartridges have a built-in lock that prevents use at temperatures below 32 degrees and above 104 degrees Fahrenheit; like disks, they should not be placed near strong magnetic fields.

In addition to the software on ROM chips, packages are available on bubble units that are exceptionally convenient both to use and to carry, though expensive in comparison with disks.

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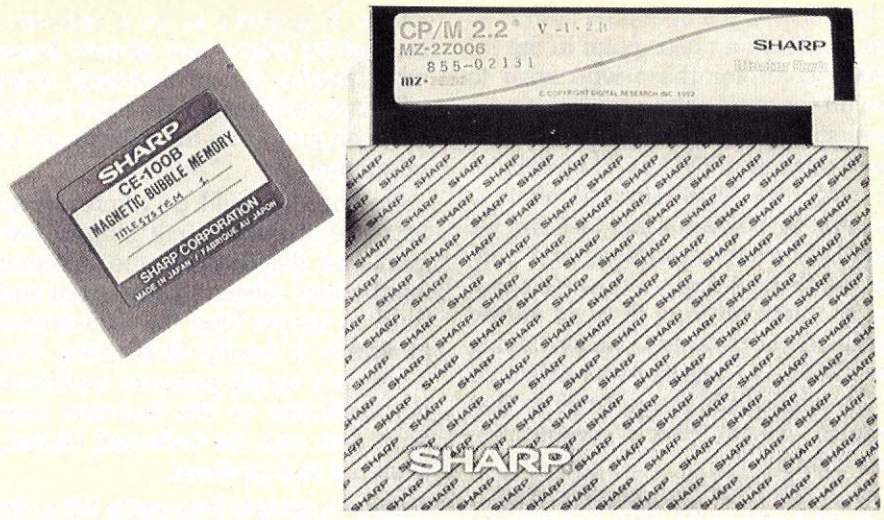
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The disk drive (CE-510F) is an accessory that can't be powered by battery. The dual-sided double-density drives with a capacity of 320KB per disk are directly compatible with IBM PC disks. Thus, the PC 5000 may well become the basic portable for IBM-based offices. Text or data files created almost anywhere can be held on the bubble for transfer either by phone or from disk to the master system. The use of MS DOS as the operating system means that a large variety of software will certainly soon be available. Only configuration for the eight-line display is required to run available software on the PC 5000.




*The Sharp PC 5000 represents a breakthrough in the portable computer market.*

### The Screen

Sharp is the largest manufacturer of LCD displays in the world. The 80-character by eight-line display may be operated in 40-character mode for those who find the small character size difficult to use; characters may be shown in reverse, double-width and underlined; the cursor may likewise be set to a number of different sizes.

The presence of the LCD makes the lid rather heavy, but following the high Sharp design standards, it's been fitted with a ratchet to allow a number of screen positions and a damping system to stop the lid from crashing down when tilted forward.

LCD-type displays can be difficult to read, especially when showing small characters. In order to see the display clearly, it's important to sit squarely in front of the machine; a thumbwheel on the right-hand side of the machine adjusts the angle of the display for easy viewing. After a few days' work with the machine, the LCD becomes much easier to work with, except in difficult lighting conditions.

The eighth or bottom line of the display may be reserved for labeling the 12 special function keys, an arrangement likely to be used in commercially available software packages.

As well as the standard ASCII character set, the PC 5000 is equipped with an extensive graphics and foreign language character set. The screen is based upon a 640×80-dot matrix, each character being formed from a five by seven-pixel block. Individual pixels may be addressed from Basic, which also includes instructions for lines, circles, ellipses and fixed or relative drawing commands. A screen dump routine will probably be available soon, allowing limited business graphics to be run on the screen.

### The Keyboard

A well-laid out and comfortable keyboard is one of the most important features of microcomputer design. Except where a mouse, touch screen or other similar device is concerned, it's through the keyboard that the user operates any machine. The keyboard has to provide facilities for simple data, text and program entry, each task having slightly different demands. In the case of the desktop machine, the problem is solved by using oversized keyboards with separate numeric keypads and other special function keys laid out in groups.

Many portables and small machines compress their many functions into a small number of keys by using complex key sequences to call up special functions. For those who learned to type on that most old-fashioned of devices, the typewriter, the PC 5000 is very easy to use; for the most part, the keyboard is arranged in standard typewriter layout.

In addition to the standard typewriter keys, there are five extra keys on the main keyboard and a row of 15 special keys above the standard arrangement. The oversized return key to the right side of the alphanumerics indicates the thought that has clearly gone into the design. A key labeled ALT provides the programmer with single-stroke Basic keywords such as Print and Input, thus making programming easier and less time-consuming.

Using the CTRL key with the letter P turns the printer on and off. In MS DOS the printer may be used as a typewriter, echoing anything displayed on the screen as it is typed in. In Basic, using the CTRL key with numeric 1 turns the graphics character set on and off, permitting more elegant designs both on the screen and in printout. An escape key is provided for running certain applications.

The special function keys include on/break and off, providing a break facility in Basic and an on/off facility to put the machine into sleep mode and thus conserve batteries. Eight special function keys, labeled F1–F8, four cursor keys and an insert make up the remainder. The special functions are set up as List, Run, Save, Load, Cont, Lpt1:, Tron and Troff in Basic; all may be user defined. The cursor keys are arranged in a left, right, up and down sequence; not an arrangement that I am accustomed to, but I soon got used to it.

The keys are well-shaped for ease of use and are colored gray for alphanumerics, orange for the on/off keys, with the remainder being brown. This arrangement helps focus the eyes on the alphanumeric keys for fast typing.

### Manuals and Programming

The manual supplied with the machine is divided into two parts. About a third (seven chapters) is devoted to an introduction of the PC 5000, its components and peripherals and the use of MS DOS. The introductory chapters are clear, concise, well-illustrated and clearly written with the first-time user in mind.

MS DOS is the operating system of this machine: a major point in the PC 5000's favor for those who wish to use off-the-shelf software. Those who have struggled in vain to understand the mysteries of CP/M will be delighted with MS DOS, since it offers a number of powerful facilities for file handling, communications and editing, while at the same time demanding no attention from the user during applications packages. Never having used MS DOS before, I was delighted to find simple file listing facilities that enabled me to check communications results.

Each MS DOS command is given a page of explanation. This is adequate for most users who'll never need to use such facilities as batch processing, but for someone wishing to understand the ins and outs of the operating system, the manual is of little assistance. Fortunately, it doesn't throw the first-time user into the same state of utter confusion faced by those using the CP/M manual for the first time.

While I'm happy with the extent of the information supplied concerning MS DOS, I can't say the same for the Basic manual: Microsoft appears to have shortchanged both Sharp and the user. It strikes me as utterly amazing that Microsoft (GWBasic for some inexplicable reason) should represent the most common implementation of Basic for microcomputers. The Basic itself is reasonably fast and has some powerful commands, but it isn't as powerful as Sharp's own FDOS Basic available on the MZ3500 business computer—a machine which, for reasons that elude me, is widely available in Europe but not in the United States. Be that as it may, Microsoft Basic will do the job and it's so widely used that Sharp can hardly be blamed for its choice.

**Surprising**

What is surprising is that the manual should remain as appalling as ever, merely regurgitated in a different format with an occasional change that relates specifically to the PC 5000. The manual seems designed to make it as difficult as possible for the first-time user to learn to write his own software; I hope there's no sinister reasoning behind this design. This manual (like too many that I have seen and used) is written by those who are totally familiar with the language. It appears to be a reference manual for others who already know what they're doing; first-time users will have to find another book before they can jump into the delicate art of programming.

I'm sure it would do Microsoft no harm to include some simple programs to demonstrate the different instructions related to sequential and random access files; the explanation of arrays is totally inadequate. Nowhere is a simple program explained that indicates to the first-time user how data can be collected, stored, analyzed and retrieved.

Error messages frequently fail to do anything other than leave the programmer bemused. It may simply be a sign of laxity on the programmer's part to value Basics that indicate, through cursor positioning, where an error has been detected, but it is incredibly useful.

That a manual can have errors in its index does little to raise one's confidence in a company marketing word processing packages (Renum and Resume have swapped places in the index). More serious is the fact that the parameter string for communications has been incorrectly stated; it took me more than two days to set up communications between the PC 5000 and the PC 1500 simply because the string as quoted in the manual is:
10 Open"Com1:600,8,N,1,RS,CS0, DS0,CD0,LF,ASC" as £1

This has the bit setting sequence in the wrong order—for MS DOS, it should read:
10 Open "Com1:600,N,8,1,. . .

The discovery of this error was more difficult because the manual-quoted sequence is the one that is conventionally used. That the error persists on a correction label pasted into the manual reflects little commitment to the end user on Microsoft's part. A fortune is to be made by anyone writing a manual to the Microsoft manual—I hope Microsoft writes it and that, in the future, it comes free with the Basic manual, which could then, with an improved explanation of the errors, be supplied as the Basic reference manual.

These strong views on Microsoft's inability to back up what is, in fact, a satisfactory product, once running, should not reflect on my judgement of the PC 5000. This problem is universal to all machines and to most computer manuals. For those who've already overcome the idiosyncracies of the Basic (remembering to enter all spaces as shown since these are not automatically set), the PC 5000 will be a delight to program, if only by virtue of its total portability.

The eight-line maximum capacity of the screen encourages you to commit more to paper during program writing than is necessary when using a full size CRT; not a bad thing, if you're to write efficient programs. Short programs can be written to printout variable, string sequence and subroutine position charts for use while programming. Having a full-width printer is an absolute boon when programming on the move and, to some extent, obviates any need for a full screen. I completed a suite of programs while flying the Atlantic without any difficulty, although when the seat in front was put into reclining position, the PC 5000 had a tendency to slide off the tray table. After four hours of use, the batteries showed little sign of power loss even though a considerable amount of printing was done.

I hope that Sharp will soon produce a CRT interface and provide the facility for switching output configuration from the eight-line to a 24-line screen. Such an arrangement would allow the user to specify which configuration was required each time the program was run and thus use the excellent computing power of the machine to its widest advantage.

**The Printer**

In a word, it's exceptional. The printer, which is marketed as a peripheral, is quite remarkable. It's easy to fit, but please note that the instructions about pulling up the clamping bracket on the cable connector are not terribly clear. The ribbon cable connector in the PC 5000 has a sliding clamp that must be pulled up before inserting the ribbon cable from the printer; a rectangular plastic plate is provided to push the sleeve back down once the ribbon is in position.

I spent some minutes looking for the sliding clamp before finally discovering it. Once the cable is correctly secured, simply slide the printer unit into the frame, tighten four screws with the screwdriver provided, fit the paper advance handle, replace the covers and you're ready to go.

To say that the printer is a dot matrix-

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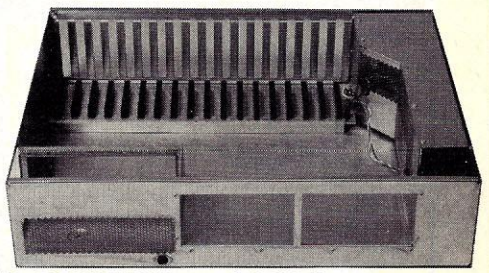
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type is correct but may give the wrong impression. It is a dot matrix but by using a 24-dot matrix, the characters have more in common with daisy-wheel characters than those formed using a conventional dot matrix machine. Although the print speed is not superfast at up to 37 characters per second, this is faster than I can type or write and is perfectly adequate. More important, the printer is silent: it employs a thermal transfer system using either thermal transfer paper with a one-time ribbon, without a ribbon or a whisper using heat-sensitive paper. A small thumbwheel located on the printer chassis is used to alter the density of the print. Electric eye sensors detect when it's out of paper or ribbon. Paper has to be sheet fed; the printer handles paper sizes up to A4 European size or B5 United States size. A pair of hooking points on the back of the frame may indicate that a roll paper holder is incorporated into the design though not yet available.

### Software

The PC 5000 is supplied with Sorcim SuperWriter and a communications package, SuperComm, designed for use with a smart direct connect telephone modem that fits into a recess in the lid of the machine.

As the software isn't yet available in England and I couldn't persuade Sharp USA to send me a set for evaluation, I can make little comment on the supplied software. I was, however, able to try out SuperWriter while visiting the United States. The whole package is completely menu-based and thus is fairly easy to use. Certainly, I found little difficulty in using it without reference to the manual, a fact which should appeal to the business user who has no desire to lug about hefty extras.

SuperCom provides good communications facilities for use with the CE-510T modem. This device, operating at 300 bits per second, stores up to ten telephone numbers that can be dialed using a single keystroke. An integral speaker and microphone also enable its use as a telephone. The modem, which weighs just over one pound, clips neatly inside the lid; it must be bought as an accessory at a cost of $349.

### A Personal View

Too often, computers are reviewed after minimal use by the reviewer with the addition of details from a specification sheet. It's difficult, after a very short evaluation, to say much more than how fast or easy any given micro is to use. After three weeks of use, I can say with complete justification that regardless of the specifications (which are outstanding, anyway) or any benchmark tests, the PC 5000 is a superb computer. I've used it in the office, on a plane, on a train and for demonstration purposes at a conference of historical archaeologists. For any task requiring the collection of large bodies of data in remote situations, the PC 5000 is the perfect machine. It offers powerful communication facilities that allow field data collection using a handheld computer, such as the PC 1500, to be quickly downloaded, verified, printed out and analyzed in the field.

The word processing package allows reports to be generated directly on site whether for scientific or business purposes; this is a valuable luxury that is made totally viable on account of the operating capacity of the machine with the bubble. On returning to the office, data and documents can be unloaded either onto the accessory disks or to another host computer for permanent storage.

At present, when any new computer is technologically backward almost as soon as it's released, consumers are concerned about buying the wrong machine. After all, a better one will almost instantly be available.

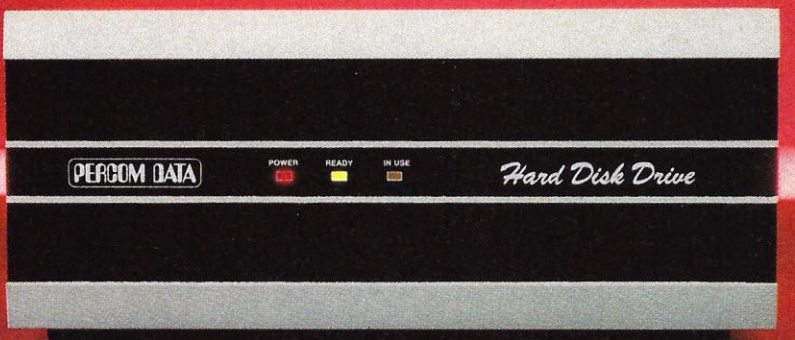
There's absolutely no logic in this argument: if you find a machine that does what you want, you've found the machine that you need. With word processing and a communications package supplied with the machine, a spreadsheet available and other software on the way, the PC 5000 will acquire a leading place among portables.

There's sure to be a huge demand for the machine—all that remains to be seen is if Sharp can satisfy it. Given a huge demand, it must be only a matter of time before other peripherals, such as a CRT interface, are produced to take this small machine into direct competition with more conventional office machines.■

*Address correspondence to D.J. Powlesland, Heslerton Parish Project, The Old Abbey, Yedingham, Malton, North Yorkshire, Y017 8SW.*

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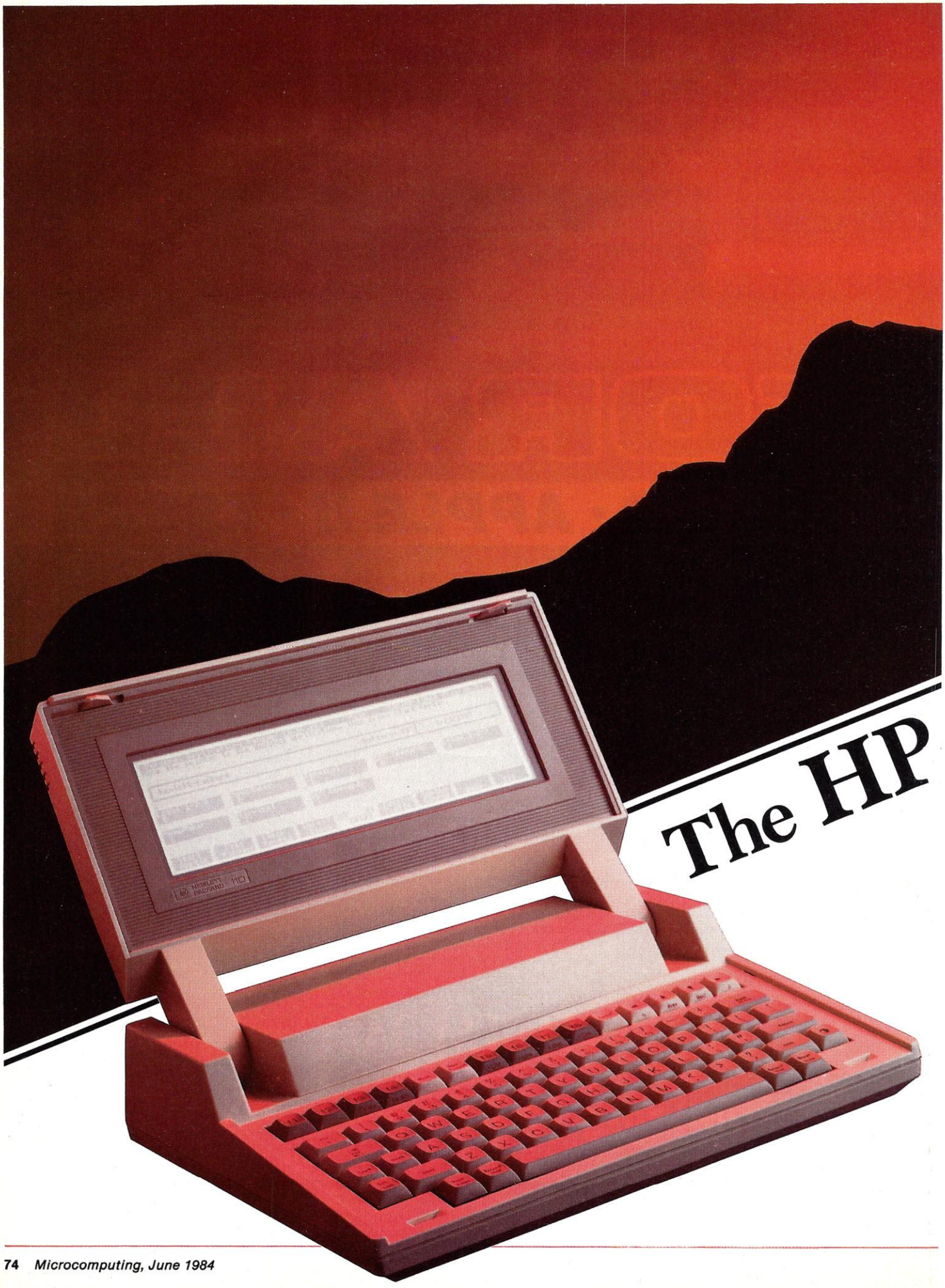
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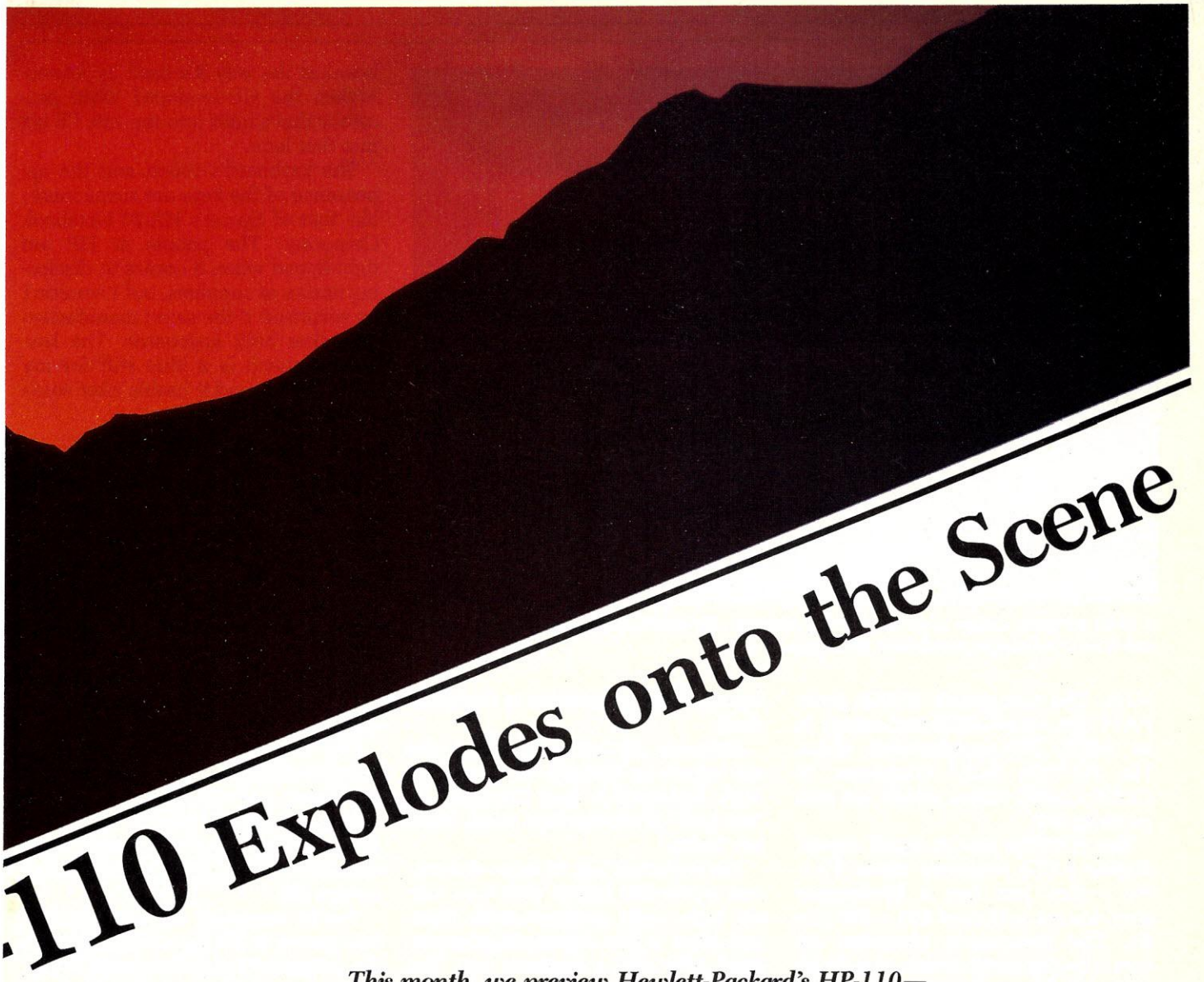
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The HP



# -110 Explodes onto the Scene

*This month, we preview Hewlett-Packard's HP-110—a machine that attempts to break through the boundaries that separate portable from desktop computers.*

By Jim Heid, Senior Technical Editor

Imagine a portable computer about the size of a big-city phone book, weighing 7½ pounds. It's white and has a flip-up liquid crystal display that shows 16 lines of 80 characters. Its 272KB of memory works like an electronic disk drive that retains your data even when the computer's shut off. The machine contains a telephone modem, a full-sized keyboard and runs on built-in rechargeable batteries. And, as soon as you turn it on, it's running MS DOS and offering you the choice of a word processor, a communications program or Lotus 1-2-3.

You've just imagined Hewlett-Packard's HP-110, the latest entry into the exploding portable computer market. Combining proven software with new hardware technologies, the HP-110 deals another blow to the boundaries that separate portable and desk-bound computers.

The HP-110 doesn't completely destroy the boundaries, however. In this preview, I detail where the HP-110's strengths (there are many) and weaknesses (there are some) lie. Because *Microcomputing*'s HP-110 was a preproduction prototype with some bugs, this article shouldn't be taken as a review of the computer. A review of a production unit will appear in a future issue.

## A Closer Look

The HP-110 strengthens the growing trend toward the generous use of CMOS technology in portable computers. (Because of their design, CMOS—short for complementary metal-oxide semiconductor—chips require very little power and generate very little heat.) The heart of the HP-110 is a Harris Corp. 80C86, a CMOS version of Intel's 16-bit 8086, running at a swift (for CMOS) 5.33



*A 16-bit computer system to go: The HP-110 computer, HP-9114A 630KB portable microfloppy disk drive and ThinkJet portable ink jet printer.*

MHz. The computer's 272KB static RAM also uses CMOS technology in its 64KB, HP-manufactured chips. The HP-110's ROM comprises 16 256KB CMOS chips, which are also made by HP.

The HP-110's 80×16 liquid crystal display (LCD) measures about 3½ × 9½ inches and has a bit-mapped graphics resolution of 480 ×128 pixels. The computer's character set uses a five by seven matrix in a six by eight cell. Many characters are made up of double-pixel-width lines in an attempt to make the display more legible (see photos).

The attempt is only partially successful. The HP-110's display suffers from a problem common to all LCDs—dimness. Unless the room light is hitting the display at the right angle, the screen is dim and difficult to read. And forget about showing off your 1-2-3 graphs at the staff meeting—you can improve the screen's contrast somewhat by adjusting its angle and by using the contrast key on the keyboard (described later), but viewing an LCD still remains a solo experience.

An HP spokesperson told me that alternate displays for the 110 were considered but an LCD was chosen because other display technologies are still too expensive. It's a shame; the HP-110's display is really the only thing that would keep me from sending my desktop machine to the closet shelf.

Although the keyboard might give me reason to hesitate, too. The HP-110's keyboard is best described as "not bad." It's better than some, but it has faults.

The keyboard has 75 keys—the normal typewriter layout plus four cursor keys, eight programmable function keys, a few communications-related keys and a contrast key. The contrast key replaces the more common (and, in my opinion, more convenient) side-mounted knob used to adjust an LCD's contrast. When you press the contrast key by itself, the screen contrast increases. To decrease its contrast, you hold down a shift key and the contrast key. If you press the contrast key for 15 seconds, you reset the computer. Resetting in this case doesn't mean losing everything in memory; you'll only lose data that hasn't been saved to a file.

The cursor keys are lined up in a row instead of being positioned in a more logical diamond shape. Worse yet, however, is the absence of a numeric keypad or even a switchable numeric keypad like many portables have. Hewlett-Packard has been making calculators for years—it's surprising to see no provision for convenient number entry on its first real portable computer.

Another negative aspect of the keyboard is the way it's used by MemoMaker, the HP-developed word processor that's built into the 110. I'll get into that later.

The keyboard's touch and the appearance of the keys are suspiciously like that of Epson's HX-20 Notebook Computer. The people at HP are tight-lipped when it comes to disclosing names of suppliers, but I wouldn't be surprised if the same manufacturer makes both keyboards. The keyboard's touch is a little stiff for my taste, but I found it usable after some adjustment time.

### Power Requirements

The HP-110 is powered by three rechargeable, D-size lead acid batteries. Lead acid batteries were chosen because their power dissipation is much more linear than that of nicad batteries; that is, the power output from nicad batteries tends to drop sharply and quickly when the batteries become discharged, where lead acid batteries discharge more predictably.

The HP-110's batteries are supposed to power the machine for 15–16 hours per 24-hour charge. Although I didn't actually test this claim, the figure seems accurate. The batteries are said to have a five-year service life.

You're reminded how much battery power is left by a status line on the computer's sign-on screen. Finally, you can also power the computer using the 12V adapter/recharger that's included.

### Input/Output with HP-IL

The HP-110 connects to the outside world through an RS-232C serial port and a Hewlett-Packard interface loop (HP-IL) port. HP-IL is a battery-powered parallel interface developed by HP. When you attach an HP-IL peripheral, it's hooked up to the computer's bus in a loop that lets you attach peripherals in daisy-chain fashion. Instructions and data originate at the computer and travel in turn to each peripheral in the loop. If the data doesn't apply to a particular peripheral, it's passed on to the next peripheral in line. When the data reaches its destination, that peripheral responds as directed, then passes on the data.

The HP-IL can transfer data at a maximum speed of 6KB per second.

HP sells an HP-IL-to-RS-232C adapter, and an HP-IL-to-HP-IB (Hewlett-Packard interface bus, also known as IEEE-488) adapter that lets you use the HP-110 with HP plotters, disk drives and other peripherals, as well as with scientific and engineering equipment that use this interface.

### Mass Storage and Hard Copy

Two noteworthy peripherals are offered for the HP-110: a battery-powered microfloppy disk drive and a battery-powered ink jet printer.

The disk drive weighs five pounds and nine ounces, and measures only 11 inches wide by eight inches deep by three inches high. It uses double-sided, double-density drives to store 630KB on a single 3½-inch microfloppy disk. (The disk format specifies 256 bytes per sector, 16 sectors per track and 80 tracks per side.) The drive transfers data at 6KB per second and has an average access time of 497 milliseconds.

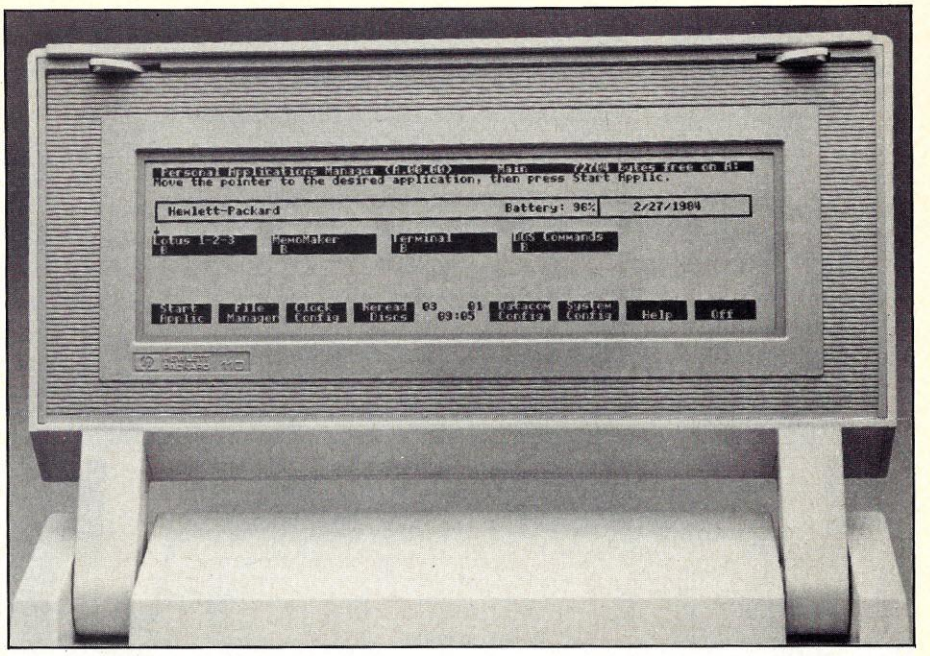
Like the computer itself, the portable disk drive is powered by rechargeable lead acid batteries, which the company claims provide six to eight hours of operation per charge.

The nicad-powered ThinkJet printer is equally impressive. Sharing the disk drive's dimensions and weighing 5½ pounds, the printer uses an $8 disposable printhead/ink reservoir that snaps in place and is good for about 500 pages. The battery pack is rated at about 200 pages per charge. The printer prints on most plain paper (though paper designed to absorb ink jet ink works best), whether fanfold or cut sheets.

The ThinkJet printer prints bidirectionally and is rated at 150 characters per second (though in my tests it rated about 80 cps). It prints bold and underlines in one pass and has four print pitches that let it print up to 142 characters per line. It also supports graphics, with resolution of either 96 by 96 dots per inch or 192 by 96 dots per inch. It has a 1KB text buffer.

More than anything, however, the printer is *quiet*. You can whisper over it and be heard. You can have a telephone conversation while it's running. To someone used to a whining dot matrix printer, this one is a godsend.

The ThinkJet printer is also available with an HP-IB interface or with a standard Centronics parallel interface. At only $495, this little gem is worth looking into, no matter what kind of computer you have.




*The Personal Applications Manager (PAM) opening screen. You run a program by pointing the black arrow to its name, then pressing return (all screen photos supplied by Hewlett-Packard).*

### The Software

Hardware is only half the HP-110 story. The other half is the machine's built-in software—MS DOS, Personal Applications Manager (an operating system shell), MemoMaker (a simple word processor), a terminal program and Lotus 1-2-3.

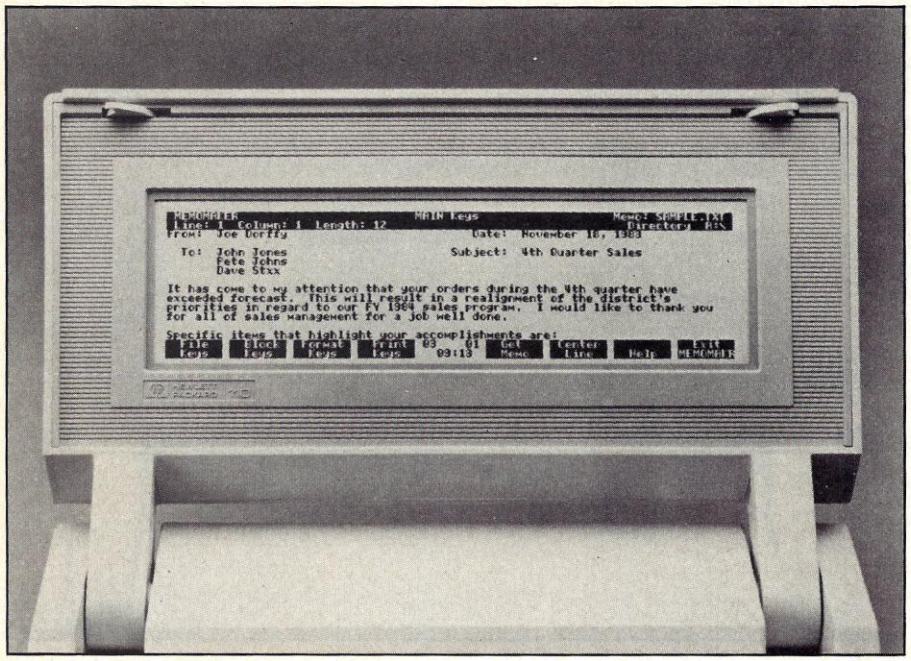
The HP-110 runs under MS DOS 2.11. Part of the computer's nonvolatile RAM is designated as drive A, while its ROM is designated as drive B. External drives are labeled starting with drive C, and you can connect up to eight. You specify the size of the RAM disk, from 32KB to 164KB, in 4KB increments.

Although the 110 runs MS DOS, some users will seldom see the familiar A> prompt. Novices and people who can't memorize operating system commands will use the Personal Applications Manager (PAM) program to run programs, view directories, delete and copy files and so on.

PAM is an operating system shell—a program that steps between you and the operating system and provides menus and help screens that eliminate the need to memorize DOS commands. Instead of seeing the A> prompt, you see a number of boxes, each containing a message like Lotus 1-2-3, MemoMaker, DOS Commands and so on (see photos). You run a program by pressing the cursor keys until an arrow points to its box, then pressing return, the select key or the F1 key. You can also type a regular DOS command at any time.

PAM displays eight softkey labels at the bottom of the screen. Pressing F1 runs a program, F2 selects a file-management option that lets you view, print, make, delete and change directories, format disks, and copy, rename or delete files. You press F3 to change the time or date and F4 to force PAM to reread the installed "disks" (which, in the 110's case, include the ROM). Pressing F5 brings up a communications configuration screen that lets you change bit rate and protocol information. F6 lets you change the system configuration, including size of the electronic disk, the display time-out time, the type of cursor and the current plotter and printer interface. Pressing F7 brings up an index of 17 available PAM help topics, while pressing F8 turns the computer's display off.

The PAM screen also displays general status information, such as time, date, free RAM disk space and the amount of battery power remaining. In all, the program is nearly identical to its counterpart on Hewlett-Packard's HP-150 and is one of the better-designed operating system shells.




*The MemoMaker word processor.*

Most operating system shells force a maze of rigid menus on you. PAM's intelligent use of function keys avoids them. Most force you either to remain at their simplistic level or not use them at all. With PAM, as you become more familiar with MS DOS, you can begin typing commands out if you like.

**MemoMaker**

MemoMaker is pretty much that—a simple word processor that's useful for letters, memos and other short documents. The program has no search-and-replace features; it can't print headers or footers and your text can print in only one way—flush left, ragged right. You can, however, center individual lines, cut and paste blocks of text and specify text as bold or underlined.

MemoMaker displays function key labels on the bottom two screen lines; the top two screen lines are status lines that tell you the current filename and directory, as well as the cursor position (see photos). You can turn off the function key labels once you memorize them, but you won't gain the two display lines they take up. HP simply modified an HP-150 version of MemoMaker to run on the 110, and it claims that the original code just isn't able to recognize that extra screen lines are available when the labels are off.

MemoMaker's biggest drawback, however, is the way it uses the HP-110's keyboard. Deleting or inserting a character or a line is a two-keystroke process—you have to hold the Extend Char key (there's one on either side of the space bar) while pressing one of the function keys. It's an awkward stretch for one hand and inconvenient for two. The HP-110's keyboard has 75 keys; you shouldn't have to go through two-keystroke gyrations to simply delete or insert a character.

The HP-110's terminal program is a conventional communications program that lets you upload to and download from remote computers. The program has an excellent feature that lets you store configuration files containing a particular service's phone number, log-on string and protocol settings. Signing on then becomes a matter of loading the proper configuration file and pressing F1, the "connect" key.

The terminal program also displays function key labels at the bottom of the screen. F1 is the connect key, while pressing F2 dials the current phone number. Typing F3 lets you set the program's configuration for file uploading. The program can upload seven- or eight-bit text files or binary files. Pressing F4 lets you set the file downloading configuration, while F5 lets you change the current terminal configuration. Finally, like MemoMaker and PAM, F7 displays help messages and F8 exits the current activity.

The terminal program fully supports the 110's built-in, autodial/autoanswer, 300-bps modem. You specify tone or pulse dialing, originate or answer mode and so on, by typing certain letters before the phone number you want to dial. For example, by typing OP924-9471, you specify originate mode and pulse dialing. Unfortunately, you have to set these options this way; you can't change them from the terminal configuration screen.

**Lotus 1-2-3**

Here's where the HP-110 really shows its stuff. 1-2-3 performs beautifully on the 110. Because it's in ROM, the program loads and is ready to use in about two seconds. (By contrast, the program takes nearly 15 seconds to load from a floppy disk on the IBM PC.)

The HP-110's screen displays a worksheet eight columns wide by 11 rows deep. The program uses all eight of the machine's function keys, as shown in Table 1. 1-2-3's excellent on-line help is fully implemented, and the help screens, because they're stored in ROM, appear virtually instantly.

Aside from these differences, 1-2-3 on the 110 operates identically to its counterparts running on other machines. The program is a bit faster, too. Thanks to the 110's true 16-bit CPU and its 5 MHz clock rate, 1-2-3 recalculates spreadsheets about 20 percent faster than it does on the IBM PC.

Hewlett-Packard had originally intended for the 110 to contain Symphony, Lotus' successor to 1-2-3. (Symphony combines 1-2-3 features with a word processor and communications features.) The two companies' product-development schedules just didn't match, however, so HP decided to go with the 1-2-3/Memo-

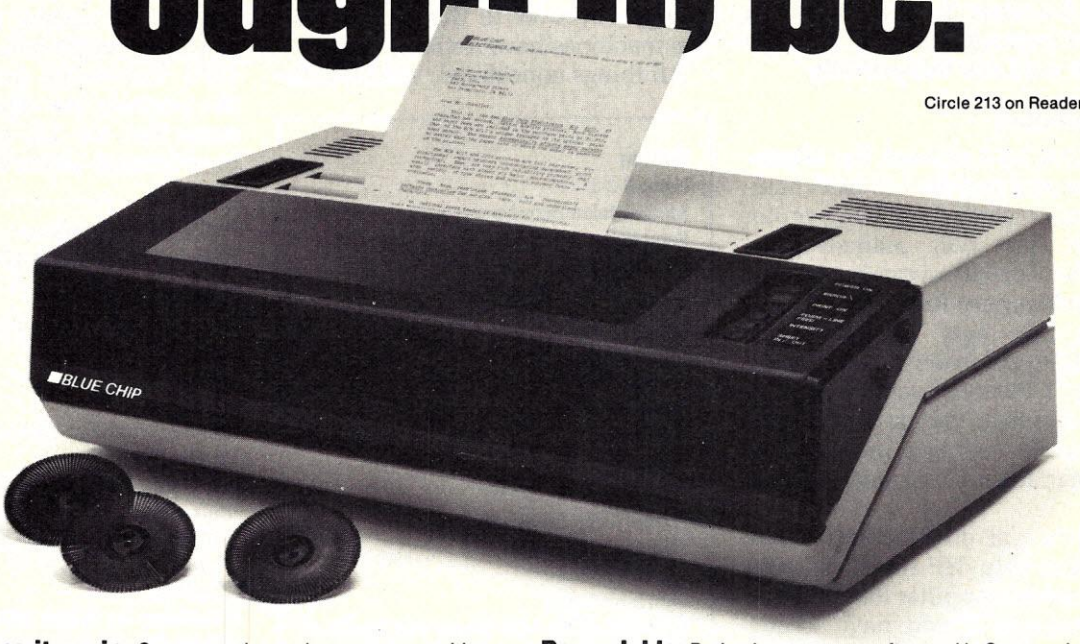
| | | | |
|---|---|---|---|
| **F1** | Help | **F6** | Window |
| **F2** | Edit | **F7** | Query |
| **F3** | Name | **F8** | Table |
| **F4** | ABS | **F9** | Calc |
| **F5** | Goto | **F10** | Graph |

*Table 1. Lotus 1-2-3 function key assignments.*



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Maker/terminal program package for now.

HP's contract with Lotus specifies, however, that HP will get the Symphony code within 48 hours of its availability on the IBM PC. When that happens, you'll be able to take your 110 to a dealer, who, for the price difference between 1-2-3 and Symphony, will install 16 new ROM chips containing Symphony.

The HP-110 is by no means limited to running its built-in software. Because the computer is MS DOS-based, plenty of software should be available for it. Converting MS DOS programs to run on the 110 is a simple matter (HP says MicroPro converted WordStar in a day), and HP plans to distribute software on two-sided microfloppy disks, with HP-150 versions on one side and HP-110 versions on the other. Table 2 contains a list of the packages that HP told me would be available immediately.

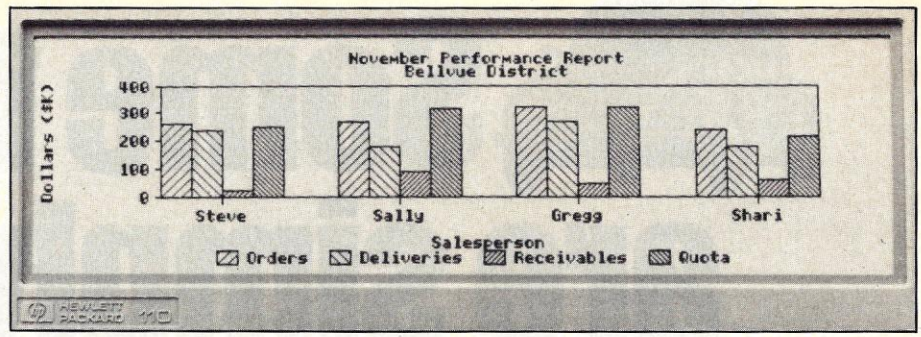
### Documentation

The Lotus 1-2-3 manual, the MemoMaker manual and the MS DOS manual weren't included with my prototype unit. The only manual I received, the HP-110 owner's manual, was in preliminary form. Still, it was complete and easy to follow (although HP still insists on spelling disk "disc"). Plenty of sample screens illustrate the text, and several appendixes provide technical information on the interface pin-outs and configurations.

The 110's real documentation lies in its on-line help. HP wisely believes that a portable computer loses a lot of its convenience if you have to lug around a set of manuals, so all the 110's software has built-in help screens. The MemoMaker, PAM and terminal program help screens are more memory joggers than detailed command descriptions, but that's really what a help screen should be. The 1-2-3 help screens are as outstanding and detailed as always.

### Lapping It Up

Hewlett-Packard sees three "applications scenarios" for the HP-110. The first is as a full-function replacement for a conventional desktop computer. The second is as a complement to desktop machines, especially MS DOS-based ones, while the third is as a portable terminal.




*A Lotus 1-2-3 graph. Unfortunately, you'll have to pass the computer around the boardroom table for everyone to see—the HP-110's LCD can't be seen clearly by more than one or two.*

I couldn't agree more with the last two, but I'm not sure about the first. Before portable computers send bigger machines to the scrap heap, they need displays that offer a full 80 characters by 24 lines and are readable in any light by more than one person at a time. Until display technology improves to that point, desktop machines have nothing to fear.

All things considered, however, the HP-110 does set the standards for the next generation of portables. The machine's heavy use of CMOS technology, its advanced battery system and the quality of its ROM-based software definitely advance the state of laptop computer art. Its on-line help is excellent; its keyboard, while flawed, is usable; and its battery-powered peripherals are outstanding. HP's knowledge and experience in the portable test equipment field ensures that the 110 is rugged enough to withstand abuse.■

**Built-in**
Lotus 1-2-3
MemoMaker (word processor)
Personal Applications Manager (PAM)
MS DOS 2.11
Terminal emulator program

**Languages**
Microsoft Pascal
Microsoft Fortran
Compiled Basic
GW Basic
Lattice C
Programmer's Tool Kit

**Productivity Software**
Microsoft Multiplan
Microsoft Word
Microsoft Chart
WordStar (with Mail Merge and SpellStar)
dBase II
R:base 4000

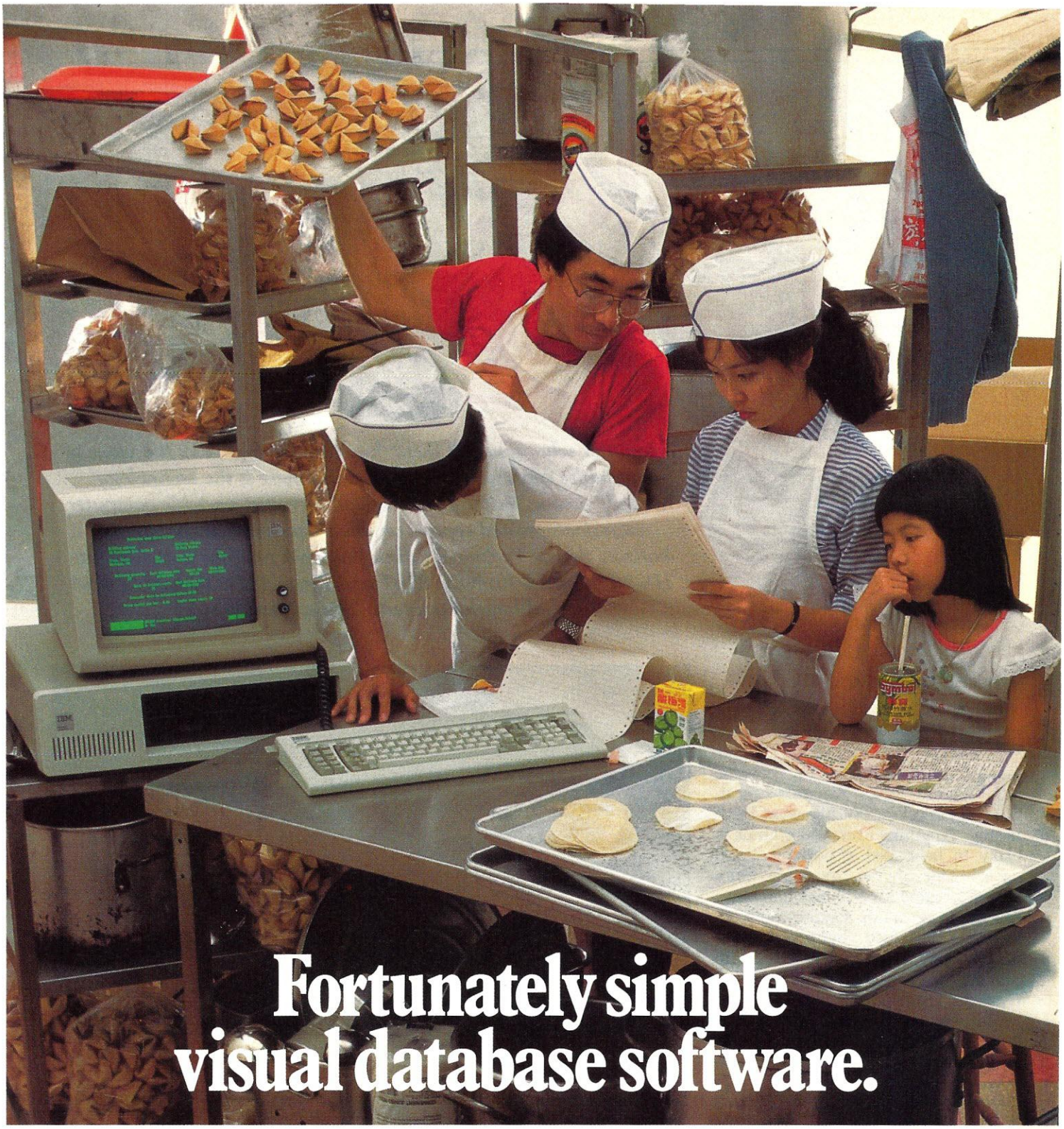
**Other**
Dow Jones Market Analyzer
Dow Jones Investment Analyzer
Dow Jones Spreadsheet Link
Home Accountant
Personal Accountant
Millionaire
Tycoon
Baron
Zork I, II, III
Personal Tax Plan
Type Attack

*Table 2. An HP-supplied list of software products expected to be available for the HP-110 at introduction time. This list is current as of early April.*

### A Capsule Look at Hewlet-Packard's HP-110

**Type of computer:**
Battery-powered portable.
**Price:**
Under $3000.
**CPU:**
80C86, running at 5.33 MHz.
**Memory:**
304KB or CMOS ROM; 272KB of continuous, static RAM; 8KB of CMOS configuration and serial number ROM; 8KB of display RAM.
**Display:**
80-column by 16-line LCD;
128 by 480 pixel, bit-mapped graphics.
**Keyboard:**
75 keys; eight function keys, four cursor keys.
**Power Requirements:**
Three rechargeable lead acid batteries, battery charger/eliminator included.
**Input/Output Ports:**
One HP-IL port (see text), one RS-232C serial port.
**Other Features:**
Internal clock, internal 300 bps modem, Lotus 1-2-3, MS DOS 2.11, word processor and terminal emulator ROM.
**Optional Accessories:**
Portable microfloppy disk drive (under $800), portable ink jet printer ($495).

*Address correspondence to Jim Heid, c/o Microcomputing, 80 Pine St., Peterborough, NH 03458.*



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Circle 83 on Reader Service card.

# Portables: Technology on the

*No matter what you call them (kneetops, laptops. . .), the wave of portables continues to rage on. But where is the technology headed? Senior Writer Eric Grevstad surveyed portable computer manufactuers and reports on what developments are on the horizon. Senior Technical Editor Jim Heid ran four portables (the HX-20, Model 100, NEC 8201 and Xerox 1810) through a series of benchmark tests. The winner is. . .*

By Eric Grevstad
Senior Writer



To quote Epson America's product development manager, Steve Irving, "Anything under 40 pounds is likely to be called a portable these days." The phrase "portable computer," created for suitcase machines like the Osborne or Kaypro, now belongs to lap-sized, battery-powered micros like Epson's HX-20 and Radio Shack's Model 100; the ac-powered types are "transportables."

This distinction would be all right if people didn't keep coming up with new names—transportables are also called "luggables," portables are "laptops" and "kneetops," and some companies are yanking the monitors off desktop machines and calling them portables.

If the terminology's confusing, the technology's slightly more settled. Right now, there are two kinds of truly portable micros—a high and low end, classified by price—and design ideas, mostly conservative, overlap among them. There will be new machines and new developments, but the manufacturers *Microcomputing* surveyed don't expect radical changes to happen soon. Until prices take a few steps down, today's portables may not be state of the art, but they'll show the state of the market.

### Two Groups Plus One

The first of today's two categories contains the pioneering HX-20 and Model 100 and the 100's lookalikes, the NEC PC-8201 and Olivetti M10. These portables' advantages are light weight (about four pounds) and low prices ($1000 or less); their drawbacks are scarce memory (the 100 tops out at 32KB RAM) and small liquid-crystal displays (Tandy offers eight lines of 40 characters; Epson, four lines of 20).

As for mass storage, the HX-20 has an on-board microcassette recorder; the 100 family relies on old-fashioned cassettes, though there are optional (expensive and nonportable) disk interfaces.

The second category overcomes the early portables' problems at a steeper cost—$2000 to $4000, plus enough weight (10–12 pounds) to cut off circulation in your lap. Two good examples are the Sharp PC-5000 and Gavilan Computer Corp.'s Gavilan.

# Move?



The former carries a flip-up eight ×80 LCD and a 128KB bubble memory cartridge, with other cartridges serving for mass storage; the latter has a 16×80 LCD, 64KB RAM and a 3½-inch microfloppy drive.

Also, while the low-end portables use eight-bit microprocessors, Sharp and Gavilan boast the same Intel 8088 CPU found in the IBM PC and promise compatibility with MS DOS software.

At the top of this second group, there's a machine that almost deserves a category to itself: the Grid Compass 1101, with everything on a portable user's wish list—16-bit 8086 CPU, 8087 math coprocessor, 256KB RAM, 384KB bubble memory, 1200 baud autoanswer/autodial modem, and a dazzling 24×80 electroluminescent display that lights LED pixels for 320×240 hi-res graphics. However, the Grid needs a 13-pound battery pack to spend even an hour away from its ac outlet, and its price is as awesome as its specs: $6795.

**What About the Rest of Us?**

To 99 percent of the portable

market, though, the Grid might as well be the Cray-1 or Cyber: You can't afford it today, and you won't see its like elsewhere for some time. For instance, its electroluminescent display is, like the exotic gas plasma panel in Strategic Technologies' PC Traveler, too expensive and power-hungry for battery-operated micros. Portables' screens may grow bigger and clearer, but they'll still use liquid-crystal displays.

"Displays [are] a real problem and LCD is about the only [technology] with battery capability right now," said John Hemphill, an analyst with Future Computing Inc.'s Technology Group. "We're still waiting for bigger displays, [but] that's a hard technical area to make advances. I think people are working on it, but it'll be a matter of time."

As anyone who's used one in dim light will confirm, LCDs aren't perfect. Neither, according to Tandy Corp.'s director of market planning Ed Juge, are Sharp- or Gavilan-style upgraded displays: "If you go to a larger screen, you get into very small letters, and there are a lot of people who don't like very small letters."

But Model 100 product line manager Bill Walters, while not endorsing the competition's 16×80 screens, expected more improvement: "Look back three years ago, when there was no such thing as an eight-line by 40-character display because of technical obstacles. The addressing mechanism wasn't there, the refreshing mechanism wasn't there, and the displays they came up with in terms of that size were terrible."

Irving, while refusing to confirm rumors of a larger-screened Epson portable, agreed that LCD technology is a stumbling block. "[When you expand an LCD,] you end up with smaller characters; if graphics is important to you, you end up with a lower resolution rate on that," he said.

"But the technology can be developed around that, and I think we'll see that addressed more adequately as new machines come out with increased display size. The LCD is still the best technology for that kind of display, [with] low power requirements and low cost."

### Memory and Money

Portable mass storage provides another example of Hemphill's claim, "In the battery-powered world, everything is really kind of technology-limited." Low-power CMOS RAM, for example, seems ideal for lap-sized storage and recall, and its price is coming down—but, Walters noted, "Not as fast as it should be."

> "Displays are a real problem and LCD is about the only technology with battery capability right now."

This, Walters said, leaves manufacturers pondering bubble memory, which is "very expensive in terms of unit cost and also in terms of battery draw when it's getting accessed."

"The problem with bubble is—it's like a big disk out there," Juge said. "You go out there, and while it's actually accessing, it can draw an amp of current, a very heavy current drain. If bubble would get cheap enough, it'd be attractive, but it's just not cheap enough yet, and I don't know if it will be. Maybe by the time it's ready CMOS RAM will be cheaper."

"Bubbles are taking a step down in price, and they will become more viable because of that as we go," Irving predicted. "Of course you get up into the $2000, $3000 machines and they're already using bubbles. But still, for the broad base, let's say for the two-computer person, somebody who needs something to carry around, that's a pretty steep investment to make.

"Our approach to [mass storage] in the HX-20 was to incorporate the microcassette, and there's a substantial tradeoff there in speed. But it's a $25 device versus an $800 one."

For the immediate future, several companies may follow Gavilan's lead and try 3½-inch disk drives. One manufacturer's spokesman joked that his staff had spent an evening discussing the possibility of wind-up drives—"We laughed for a long time about that, but when you think about it, the battery drain is in the motor, not in the logic or the read/write mechanism. It's conceivable you could use clockwork and bring down the cost."

### Any New Chips?

The Model 100 uses an eight-bit CMOS microprocessor, the 80C85, but the high-priced portables use regular 8088s and 8086s; 16-bit CMOS chips, like Harris Corp.'s 80C86, promise PC performance with one-tenth of the power requirements, but few have appeared in production machines yet.

For now, Hemphill said, "You save some [power cost] by going to the different processor, but you really don't save that much. There are so many other power-consuming components in the machine that switching the processor to CMOS doesn't make that much of a change."

In the meantime, "All of the CMOS technologies are going to come down [in price]," Irving said. "It's not particularly driven by the portables; more CMOS devices are working their way into conventional applications in desktops because of the low heat output.

"Where power consumption and heat are not a factor, the speed has been a barrier to CMOS in that kind of environment, but the technology will be refined and become faster. As more speed is put into CMOS it should pass through 16- and into the 32-bit processors with no problems."

As for portables following desktops out of the eight-bit world, Walters said, "I think there's quite a bit of life left in eight-bit CPUs for handheld devices. Sure, there's going to be an upscale end of the market with 16 bits with 128KB or 256KB CMOS RAM, for those with the bank account to afford it, and a big LCD.

"But there's some obstacles to overcome in terms of pricing and, quite frankly, CMOS devices are much more expensive than their NMOS counterparts. Frankly, it's a twofold problem—one, [chip] yields and two, that there's not a lot of U.S. manufacturers interested in doing it."

### Sizing Up the Market

Walters' comment indicates one of the major factors behind the future of portable design: the size of the portable market. "Volume certainly contributes to lowering of prices as much as advances in technology," Hemphill pointed out. "One of the issues with battery-powered machines is exactly how popular they are."

As for that, Future Computing, Inc. estimates sales of battery-powered micros will jump from 240,000 this year to roughly 1,500,000 in 1988, moving from nine percent to 21 percent of the computer market. (Desktops will fall from 75 to 65 percent,

and transportables from 16 to 14 percent.)

The machines people buy in 1988, though, should have only batteries in common with their ancestors of 1984. For now, Hemphill said, "The user is going to pay a price, a premium, really, for the portability, and the question is how much he's willing to pay for that." And, so far, people don't seem willing to pay for optimum technology.

Summing up the market, Gavilan Computer Corp. president Manny Fernandez said, "I think what we're going to see next is evolution and more competitors. I don't foresee major changes, maybe a little bigger screen here, more memory there. But I think there're two markets, a low end and a high end, and I think [both have been] pretty much stabilized all along."

Of those two classes, Epson and Tandy have pledged to continue supporting the sub-$1000 end, and machines in the Sharp or Gavilan range should fill the upper level. Hewlett-Packard's new HP-110 has interesting specs (notably Lotus's 1-2-3 in ROM), but not radical ones; in some ways, it's an American, available version of Australia's 16-bit, 16×80 Dulmont Magnum, announced at Comdex but still shy of the U.S. market.

### One New Development

Among nonGrid portables today, in fact, the most ingenious technology is the simplest—putting desktops on a diet. The idea goes back to STM Electronics' unloved CP/M Pied Piper, by way of home computers like Commodores and Ataris: provide a micro with no video to be plugged into a monitor at work or a home or hotel TV set.

Visual Computer Inc.'s Commuter is a 17-pound IBM PC clone, while Apple's new IIc is a trimmer seven pounds (and has a 65C02, the up-to-date CMOS version of the IIe's trusty eight-bit CPU). Both supply a keyboard and 5¼-inch disk drive and can be fitted with an optional flip-up LCD if no monitor's around. The IIc, due in six months or so, promises a full 24×80 display.

On one hand, machines like the Commuter and IIc look reasonably handy; on the other hand, they need ac power cords and prefer desks to laps. Basically, they're transportables instead of portables—unless someone invents another term and starts calling them semiportables. "Kneetops" is bad enough; it sounds like computer hosiery.■

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# Four Portables Battle It Out

By Jim Heid
Senior Technical Editor

## Benchmark Results

How do four competing portables stack up against each other when it comes to speed? To find out, I ran and timed six Basic programs on each.

Listing 1 is a simple for...next loop. Listing 2 is a simple counting loop that counts to 5000. Listing 3 adds a line with math functions that use variables as arguments. Listing 4 presents the same math functions but replaces the variables with constants. Listing 5 generates prime numbers using the Sieve of Eratosthenes algorithm. Listing 6 tests three things: the time required to read 50 names from data statements into a string array (test 6A in Table 1), the time required to sort those 50 names alphabetically (test 6B) and the time required to print the names on the screen (test 6C).

The results of my tests are shown in Table 1. The overall winner? The NEC 8201. In fact, it's interesting to note that the 8201 is almost twice as fast in computation-heavy applications as its close cousin, the Radio Shack Model 100, yet the computers have the identical CPUs running at the same clock rate.

Next in line is the homely Xerox 1810, followed by the benchmark of laptops itself, the Radio Shack Model 100. The elder of the pack, Epson's HX-20, brings up the rear with a yawn-inspiring performance.

What does it all mean? Not too much. Benchmark speed tests tell a small part of the story. In fact, they're really only applicable if you plan to do a lot of programming in the particular language in which the benchmarking programs were written. Nonetheless, benchmarks are hard to resist, and they give us technical editors something to do during the New Hampshire winters.

| Test | Epson HX-20 | NEC 8201 | Model 100 | Xerox 1810 |
|---|---|---|---|---|
| 1 | :13 | :08 | :15 | :08 |
| 2 | 1:15 | :28 | :46 | :43 |
| 3 | 2:46 | 1:22 | 2:07 | 1:33 |
| 4 | 2:43 | 1:21 | 2:33 | 1:36 |
| 5 | 6:03 | 2:09 | 2:38 | 3:23 |
| 6A | :01 | * | * | * |
| 6B | :41 | :15 | :17 | :17 |
| 6C | :08 | :16 | :18 | :03 |

* times were less than one second and, therefore, were too small to measure using the computer's internal clock.

Thanks to Beve Woodbury, technical editor of *Microcomputing*'s sister publication, *80 Micro*, who provided some of the benchmarking programs used, and to Jill Hall, *Microcomputing*'s administrative assistant, who claims she typed the listings so many times that she memorized them.

*Table 1. Results of benchmark tests.*

```
10 'Listing 1
20 'Simple FOR-NEXT loop
25 TIME$="00:00:00"
30 PRINT TIME$
40 FOR K=1 TO 5000
50 NEXT K
80 PRINT TIME$
90 END
```

*Listing 1. Simple for. . . next loop.*

```
10 'Listing 2
20 'Simple counting loop
25 TIME$="00:00:00"
30 PRINT TIME$
40 K=0
50 K=K+1
70 IF K<5000 THEN 50
80 PRINT TIME$
90 END
```

*Listing 2. Simple counting loop.*

```
10 'Listing 3
20 'Simple loop with math functions
25 ' using variables
28 TIME$="00:00:00"
30 PRINT TIME$
40 K=0
50 K=K+1
60 A=K/K*K+K-K
70 IF K<5000 THEN 50
80 PRINT TIME$
90 END
```

*Listing 3. Counting loop with math functions using variables for arguments.*

```
10 'Listing 4
20 'Simple loop with math functions
25 ' using constants
28 TIME$="00:00:00"
30 PRINT TIME$
40 K=0
50 K=K+1
60 A=K/2*3+4-5
70 IF K<5000 THEN 50
80 PRINT TIME$
90 END
```

*Listing 4. Counting loop with math functions using constants for arguments.*

```
10 'Listing 5
20 'Generate prime numbers from 1-5700
25 TIME$="00:00:00"
30 DEFINT A-Z
40 PRINT TIME$
50 S=5700
60 DIM F(5701)
70 C=0
80 FOR I=1 TO S
90 F(I)=1
100 NEXT I
110 FOR I=0 TO S
120 IF F(I)=0 THEN 200
130 P=I+I+3
140 K=I+P
150 IF K>S THEN 190
160 F(K)=0
170 K=K+P
180 GOTO 150
190 C=C+1
200 NEXT I
210 PRINT C, "PRIMES"
220 PRINT TIME$
230 END
```

*Listing 5. Prime number generator.*

```
10 ' Listing 6
20 ' READ/DATA, Sort, & Print test
30 CLEAR 5000:RESTORE
40 N=50
50 DIM A$(N+1)
60 ' READ NAMES FROM DATA STATEMENTS
70 TIME$="00:00:00"
80 PRINT TIME$
90 FOR K=1 TO N
100 READ A$(K):NEXT
110 PRINT TIME$
120 INPUT "Hit RETURN to continue"; X$
130 'BUBBLE SORT
140 TIME$="00:00:00"
150 FOR C=1 TO N
160 FOR K=C+1 TO N
170 IF A$(C) < A$(K) THEN 210
180 T$=A$(K)
190 A$(K)=A$(C)
200 A$(C)=T$
210 NEXT K
220 NEXT C
230 PRINT TIME$
240 INPUT "Hit RETURN to continue";X$
250 'PRINT SORTED LIST
260 TIME$="00:00:00"
270 FOR K=1 TO N+1
280 PRINT A$(K)
290 NEXT K
300 PRINT TIME$
310 END
320 DATA Johnn, Thosa, Queck, Fripe, Ammid
330 DATA Ghesa, Weisc, Grisg, James, Duasn
340 DATA Those, Blank, Plick, Zoard, Vince
350 DATA Milos, Lhanc, Ghack, Cough, Choke
360 DATA Weeck, Xylog, Stank, Opial, Jerky
370 DATA Younz, Eaclg, Udsva, Gosap, Knock
380 DATA Files, Tandy, Epson, Hello, Iljak
390 DATA Oscar, Wayne, Green, Wobbl, Dunca
400 DATA Momme, Marye, Denny, Georg, Billy
410 DATA Qycka, Woosh, Zebra, Filly, Redro
```

*Listing 6. Read/Data, bubble sort and display print test.*




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Tractor for F-10. . . . . .$225

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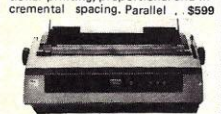
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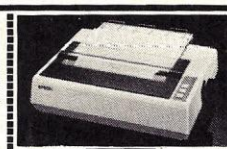


**NEC**

**3550 Spinwriter,** 350 wpm, 203 col., auto proportional space, justification, bi-directional, parallel. $1,675.
**2050 Spinwriter,** similar to above but 200 words per minute . . .$CALL
**Cutsheet Feeder** for 3550 . . . $CALL
**7730 Spinwriter,** 55 CPS, IBM compatible. . . . . $CALL

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**8510AP Prowriter,** 120 cps, 80 col., graphics, parallel . . . . . $335
**8510-SP,** above but 180 cps . . $CALL
**8510-SCP,** above but w/3 color ribbon (red, yellow, blue), also capable of doing orange, green, purple, blk Call
**1550 Prowriter-II,** 120 cps, 136 col., 2K buffer, graphics, parallel. $569
**1550-SP,** above but 180 cps . . $CALL
**1550-SCP,** similar to 8510-SCP but w/ 15" carriage . . . . . $CALL

**STAR GEMINI**

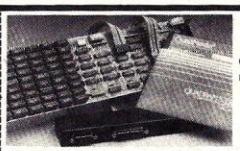
**Gemini-10X,** 120 CPS, 80 Col., friction & tractor feed, (parallel) .$Call
**Gemini-15X,** above w/15" platen.Call
**Delta-10,** 160 cps, 80 col., parallel . Call
**Delta-15,** above but 15" carriage . . Call
**PowerType,** 18 cps daisywheel . . CALL
**Radex-10,** 200 cps, 80 col, parallel CALL

**IDS PRISM**

**IDS Prism 80,** 200 cps, 80 col, graphic, tractor/friction feed,parallel $1,159
**IDS Prism 80C,** above + 4-color .$1,259
**IDS Prism 132,** similar to Prism 80 but 132 columes, parallel . . . . $1,395
**IDS Prism 132C,** above + 4-color $1,495

**OKIDATA**

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**ML-83A,** 160 CPS, 136 col., tractor & friction feed, parallel/serial $595
**ML-84P,** 200 CPS, 136 col., friction & tractor feed, (parallel) . . . .$989
**ML-84S,** above but serial. . $1,059
**ML-92P,** 160 CPS, 80 col., friction & tractor feed, (parallel) . . . .$499
**ML-92S,** above but serial. . . .$599
**ML-93P,** 160 CPS, 136 col., tractor & friction feed, (parallel). . . $739
**ML-93S,** above but serial. . . . $799



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|---|---|---|---|---|---|---|
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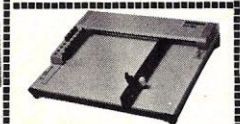
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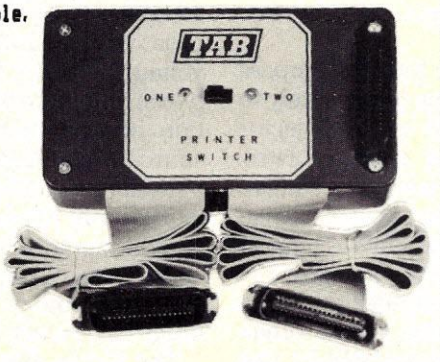
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# The Grid Compass: The Porsche of Portables?

By Jim Heid, Senior Technical Editor

The Grid Compass: It's a portable computer that's been on a space shuttle mission, where it helped compute navigation data. It's been certified as espionage-proof by the U.S. government. It runs its own operating system and integrated software as well as MS DOS and many popular programs, including 1-2-3, WordStar and Condor. It has a futuristic flat display, bubble memory and two microprocessors. It costs about $636 a pound.

But is it worth $5995, the price of an "entry-level" Compass? Well, yes, sort of. It's worth it like a Porsche is worth its price—you pay a ridiculous amount of money, but you get a mix of features, performance and quality that you just can't get for less. Whether that extra performance is worth six grand is something that only you (and your accountant) can decide.

### Its History

When it was introduced in 1982, the Grid Compass cost $8000 and ran only its own operating system and integrated software, and the only way you could get the software into the machine's bubble memory was to download it from Grid Central, Grid's over-the-phone software distribution network. In all, it wasn't the most marketable package and, needless to say, sales suffered.

In February of 1983, however, Grid introduced its portable disk drive and a version of MS DOS, opening up a much wider selection of software. Last July, it announced a version of Lotus 1-2-3 tailored to the Compass. These moves made the Compass a more viable, though still expensive, product.

This year, Grid revamped its product line to create three Compass models. The Compass 1100 ($5995) contains 256KB of RAM and 384KB of bubble memory. The Compass 1101 ($6795) contains the same, plus a built-in, 1200 bits per second (bps) autodial, autoanswer modem. The Compass 1109 boosts the machine's RAM up to 512KB and its price up to $7995. The Capsule Look lists the prices for some of the Grid's accessories and software.

Actually, there's a fourth Compass model, but it's not one you're likely to consider, unless your car has ejector seats and revolving license plates. The Compass 1107 (are those last two digits just a coincidence?) is designed to meet the government's Tempest specifications, which, to us mere citizens, means the computer emits no radio interference that might otherwise be received and decoded by The Other Guys. Appropriately enough, the Compass 1107 is priced at $12,495. (Ever wonder what the government pays for blank disks?)

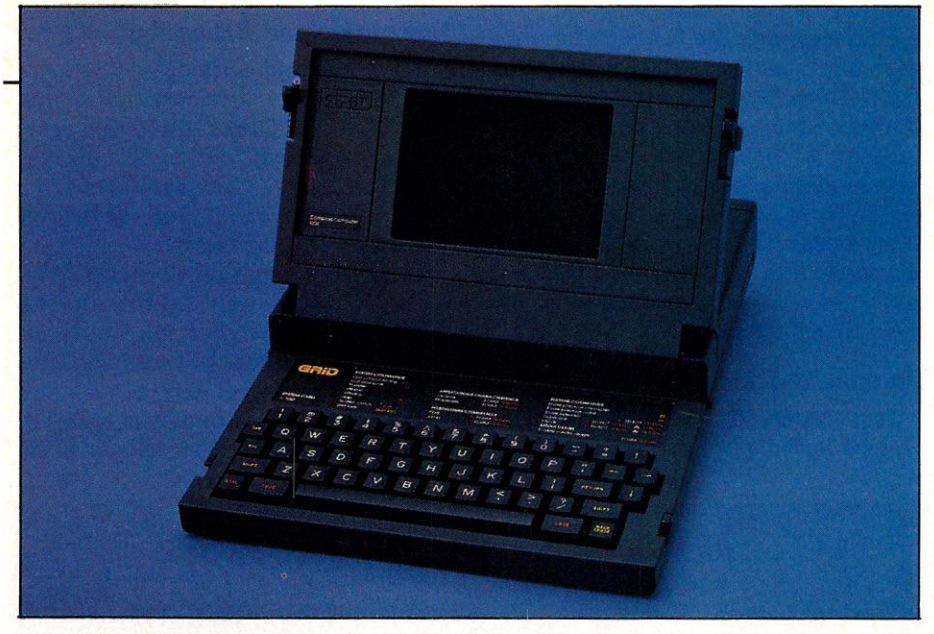
The evaluation setup provided to *Microcomputing* comprised a Compass 1101 and a 2102 portable disk drive, a double-sided, double-density unit that stores 360KB. Software provided included Grid's unique operating system, integrated software (Grid Write, File, Plan and Plot) and Grid Basic, as well as MS DOS, Lotus 1-2-3, and Ashton-Tate's dBase II, version 2.4.

### A Closer Look

The Grid Compass measures a tidy 15 inches long by 11½ inches wide by two inches deep and tips the scales at under 11 pounds. It feeds on 120 or 220V ac current, consuming 60 watts. Actually, Grid claims that the Compass will operate properly on any voltage between 90 and 140V or between 160 and 280V—great for operation in areas with unreliable power sources (like Central America?). An optional 12V, 13-pound battery pack lets you run the machine for one hour from a single 16-hour charge. A dc inverter, also optional, lets you run the machine from a cigarette lighter or other 12V power source.

The Grid's sleek black magnesium

*It has been on a space shuttle mission, it's certified for spy duty and it features the latest technologies in the industry, but is the Grid worth its $5995 (for the basic unit) price?*



case, which serves as a heat sink to dissipate the heat generated by the computer's components, gets rather hot. Using a very unscientific technique (a darkroom thermometer) in a 70°F room, I measured it at a toasty 108 degrees. This is one laptop computer that'll really keep your lap warm.

Inside the Compass, a 16-bit 8086 and an 80-bit 8087 math coprocessor running at 6 MHz provide more processing punch than the IBM PC and most of its clones. The 384KB nonvolatile Intel bubble memory transfers data at a speed of 12.5K bps. A 16KB ROM contains the machine's boot code and device drivers. The Compass performs all internal calculations with 18½ digits of precision and can display the results with up to 15½ digits of precision.

The Compass's internal modem is a 1200/300 bps, Bell 212A and 103A compatible, autodial/autoanswer unit manufactured for Grid by Racal-Vadic. When the computer's running under MS DOS, the modem emulates most of the Hayes Smartmodem 1200 command set.

The Compass connects to the outside world through an IEEE-488 (General Purpose Interface Bus, or GPIB) interface. The IEEE-488 bus lets you attach up to 15 peripherals to the Compass in daisy-chain fashion. (See *Microcomputing*, April 1984, p. 116 for more information about the IEEE-488 bus.) Grid's portable disk drive and its 10MB hard disk connect to this port.

The Compass also has an RS-422/RS-232C serial port for connection to external modems and other serial devices. To conserve space on the unit's rather crowded back panel (see Photo 1), Grid used a DB-19 instead of the more common DB-25 for the RS-422 connector. They do, however, sell a DB-19 to DB-25 adapter.

The Compass has an internal clock/calendar that's powered by a lithium battery. The calendar is used to time- and date-stamp files created under Grid's operating system and under MS DOS. You can also run a program that displays an analog-style clock on the Compass's screen, turning the computer into the most expensive desk clock around.

### On Display

The Compass's most distinctive feature is its fold-up, flat-panel display. Manufactured by Sharp, the six-inch (diagonal) electroluminescent display does not, however, represent a new breakthrough in technology. Similar displays have been used for years in jet aircraft, where visibility under dim light is important. The display is, however, the most readable display of any portable computer. Because each pixel is actually a minute LED, the display emits light (unlike a liquid crystal display). Its contrast and crispness are excellent and it's easily read by small groups, despite its petite size.

The Compass's bit-mapped screen boasts resolution of 320×240 pixels and can display up to 80 columns by 24 lines of text. When using Grid's operating system, you can choose from a number of display formats, including 53×24 (the default), 64×13, and 80×24. Under MS DOS, the display format is always 80×24. The text font is very legible, although in 80-column mode, the characters lose some of their clarity (see photos).

Another factor that contributes to the screen's clarity is its 66 Hz screen-refresh rate. That means the image on the screen is redrawn 66 times every second, about twice the refresh rate of a video tube. The result is a display with absolutely no discernible flicker.

### The Keyboard

Made by Microswitch, the Compass's keyboard contains 57 keys—a typewriter-like layout, plus a control key and escape key, two code keys and four cursor-movement keys. With larger return and shift keys and with cursor keys positioned in a diamond




*Photo 1. The Grid Compass rear panel.*

shape, the layout is logical and comfortable. The two code keys, used much like control keys by the Grid software, are located on either side of the space bar. This computer doesn't discriminate against (us) lefties.

The keys themselves have a rich black textured finish. Although I like their touch, they're a little noisy. They make a metallic clicking sound when you press them *and* when you release them.

You're reminded that the Compass keyboard has only 57 keys when you use MS DOS. The keyboard lacks function keys (used by almost all MS DOS software) and special characters like brackets ([]), braces ({}), a vertical bar (|) and a backslash (\), many of which are used in MS DOS 2.0 pathnames and commands.

Grid supports the function keys using a combination of the code key and the number keys 1 through 0. To get the special characters, you have to go through a three-keystroke sequence. The sequence for a left brace ({), for example, is shift-code-comma, while a backslash is code-shift-apostrophe. It's awkward, but it's the price you pay to have a keyboard that measures 3½ × 10½ inches.

### Portable Disk Drive

The 2102 portable disk drive weighs seven pounds and measures 11 × 10 × 2 inches. It, too, is ac powered, consuming 50 watts. According to Grid, the data transfer rate between the disk drive and its buffer is 31K bps. The transfer rate across the eight-bit parallel IEEE-488 bus between the drive buffers and the computer is 250K bps.

The slimline drive's stepper motor is fairly quiet, and the portable disk drive has no cooling fan, making the unit aurally unobtrusive. My review unit, however, had a power supply that gave off a quiet but annoying high-pitched squeal that warbled as the drive's head stepped in and out. The noise seemed to lessen after the drive had been on for a while (either that or the noise attenuated my hearing).

### Integration and Digression

As mentioned earlier, the Compass can run under two operating systems: CCOS, Grid's own operating system, and MS DOS. I'll discuss CCOS and Grid's integrated software first, then I'll cover MS DOS and some MS DOS software.

CCOS, for Common Command Operating System, was the first operating system offered for the Compass. Its most distinctive feature is its user interface (the set of commands and menus that let you control a computer and its software), which relies on

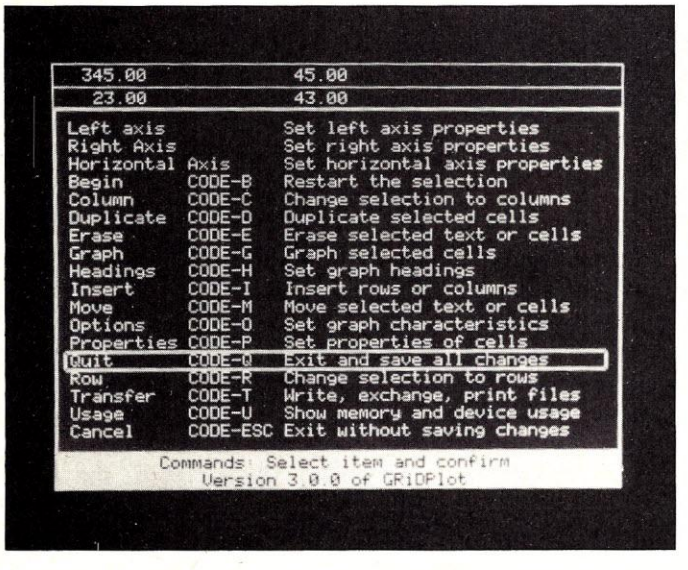



*Photo 2. A typical Compass commands menu. You can select commands by typing the code key sequence in the second coloumn or by moving the outline box to the desired command and typing Code-return.*

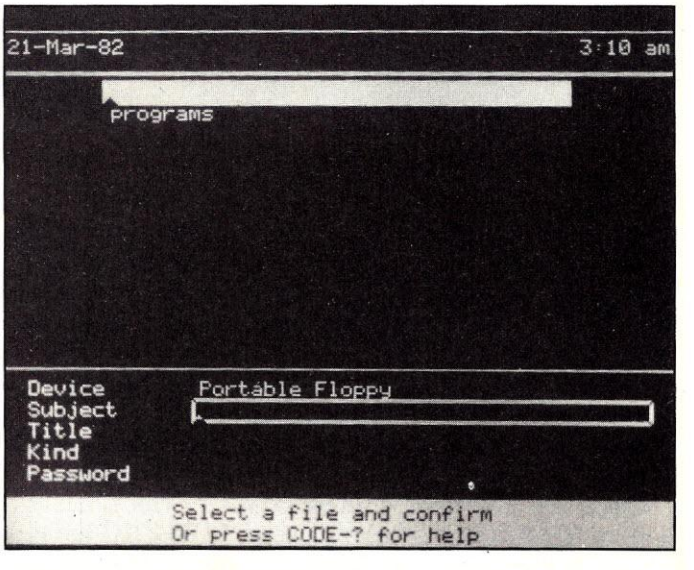



*Photo 3. An empty file form. In this screen, the portable floppy has been specified as the device. Moving the white bar at the top of the screen over the word "programs" produces the screen.*

"file forms" (explained later) and common commands, which are consistent from program to program.

Before continuing, let me briefly digress to explain the value of a consistent user interface. Until recently, computer manufacturers didn't give a hoot about consistency or about their machines' user interface (most still don't). They designed the hardware, stuffed someone else's operating system into it and left the "trivialities" of man-machine interaction up to the programmers who wrote the applications software. You know the result—some programs use function keys; some use menus; others use control-key sequences. Because most every program is controlled differently, more time is required to learn each one.

The advantage of a consistent set of commands is that once you have learned how to use one program, you're well on your way to knowing how to use the others. It makes learning to use a computer much easier for novices. The disadvantage, in the Compass's case, is that you're stuck with a completely nonstandard operating system, meaning that, unless you buy the portable disk drive and MS DOS software, the only programs you'll see are the ones Grid wants you to see.

With my digression out of the way, let's look at Grid's approach to command consistency.

### Common Commands

The Grid Management Tools, as the Compass software is called, use a common set of commands, and all commands rely on the computer's code key. For example, typing Code-O always displays a given program's options. Code-B always begins a selection process, whether you're selecting text in Grid Write or cells in Grid Plan. Code-U displays memory and device usage information, while Code-? always displays the commands menu (described later). Code-T always invokes the transfer command, used for loading and saving files, and Code-Q always means "quit."

Grid's software cleverly uses all the letters from A through W along with the code key for common commands. Not all commands are used in all programs, of course, but the ones that are used in more than one program all work in the same way. It's a well-designed command structure, and it works: The Grid Management Tools are easy to learn and use.

### Menus and the File Form

Common commands are only part of Grid's approach to integration. Each program's commands menu and the CCOS approach to filenames are equally important.

Each Grid program has its own commands menu, which you display by typing Code-?. The menu provides a reference list of available commands, with an outline box around the first command (see Photo 2). You invoke a command by typing its code-key sequence, which is shown in the second column of the list, or by moving the outline box (using the cursor keys) down to the command you want, then pressing Code-return.

CCOS takes a different approach to filenames, one designed to minimize the amount of typing required to use a file. You have to type a filename only once—when you first create the file. After that, you simply select the file from a menu.

A Compass filename has five parts: device name, subject, title, kind, and optional password. The device name shows where the file is stored (bubble memory, floppy disk or hard disk). The subject name shows the category to which you assigned the file. A subject is just a collection of related files with an assigned name. You might have a subject called Word Processing that holds all your Grid Write files, another called Sales Forecasts that holds your Grid Plan files and so on.

The next part of a filename, the title,

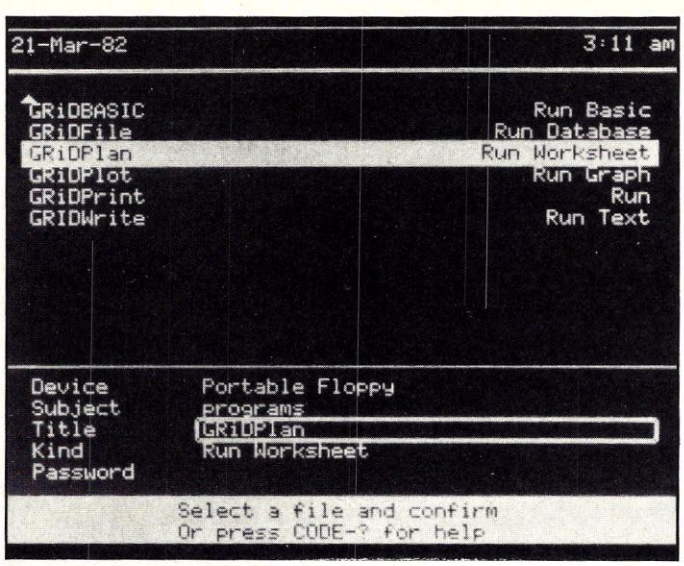



*Photo 4. The completed file form. The program names on the top half of the screen are the files stored under the "programs" subject. The rest of the form was completed not by manually typing each item but by simple moving the high-lighted bar to the desired file (in this case, Grid Plan).*

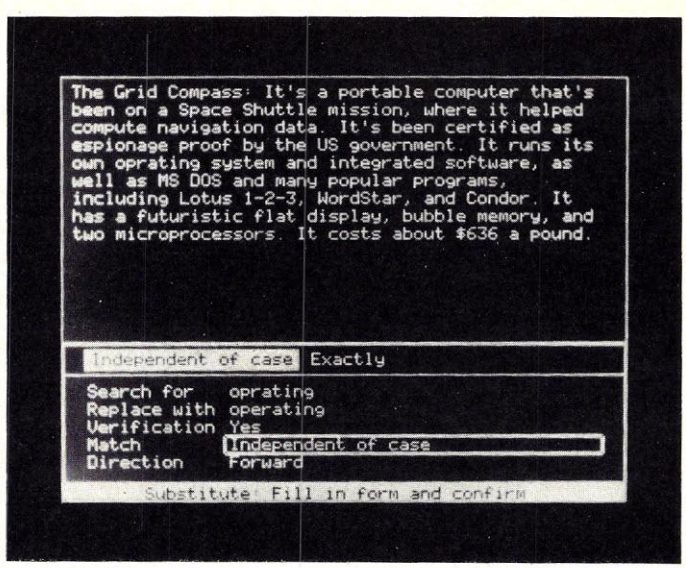



*Photo 5. The Grid Write word processor. Grid Write's search-and-replace function has been selected.*

| Mathematical | Trigonometric | Business/Statistics | General |
|---|---|---|---|
| square root | sine | average | calculated cell reference |
| absolute value | cosine | sum (total) | search (for a value) |
| integer value | tangent | maximum value | current date |
| pi (constant) | arcsine | minimum value | current time |
| exponentiation | arcosine | unit count | |
| natural log | arctangent | net present value | |
| common log | | internal rate of return | |

*Table 1. Grid Plan built-in functions.*

shows the actual name of a file. A title can be up to 30 characters long and can contain spaces and special characters. This gives you great flexibility in naming your files.

The final filename component, the password, is optional. For additional security, when you type a password, its characters don't appear on the screen.

To work with a particular file, you complete what's called the file form. The file form contains a place for you to type a device name, subject, title, kind (described later), and password (see Photos 3 and 4). You can type the required information, but that would defeat the purpose of the file form. The more efficient file selection method involves using the cursor keys to move a highlighted bar to the desired file, then confirming your selection by typing Code-return.

After you've confirmed your selection, the computer runs the program needed to work with the file. For example, if you select a text file, the computer executes the Grid Write program and loads your file.

Now let's take a capsule look at each of the Grid Management Tools.

## Grid Write

Grid Write is the Compass word processor. It's a full-screen text editor that lets you work with files up to 64,000 characters long. Its features include:

- commands to insert, erase, move and duplicate any length of text anywhere in the document
- horizontal and vertical scrolling
- document width of between one and 250 columns
- search and replace commands
- the ability to merge graphs and data from other Compass programs while printing.

Grid Write has no text-formatting features of its own. When you print a document, you use Grid Print, a text formatter that supports headers, footers, margin control, justification, pagination, time and date and special print features like bold, enlarged and condensed type, and italics, subscripts and superscripts. Photo 5 shows a typical Grid Write display.

## Grid Plan

Grid Plan is one of the most powerful spreadsheet programs you'll find on a portable. It supports the Compass's 8087 math coprocessor, meaning that spreadsheet recalculations are lightning fast. It also means that calculations are accurate to 15½ digits.

In Grid Plan, columns are labeled alphabetically and rows are labeled numerically. You use the computer's arrow keys to move around a 255-row by 255-column spreadsheet. Grid Plan lets you vary column widths from zero to 48 characters and has the usual formatting features—left justified, right justified, dollars and cents format, scientific notation and so on. Some of its other features include conditional (if-then) operators for cell definitions and duplicate, move and erase commands. Grid Plan also has more than 20 intrinsic mathematical, trigonometric, business and statistical functions, which are listed in Table 1.

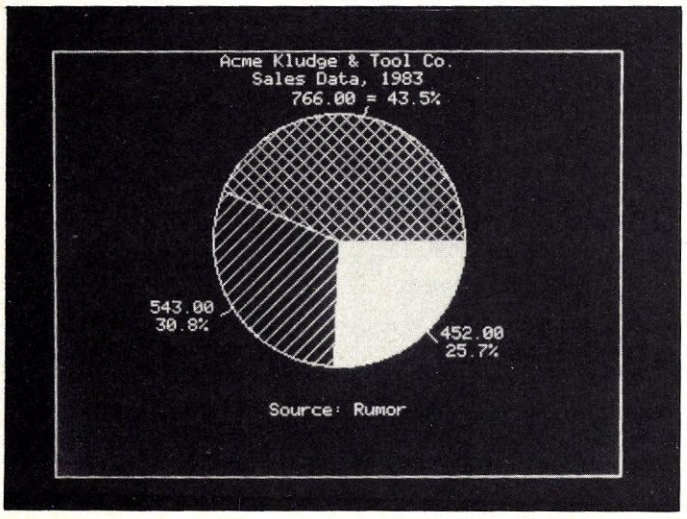



*Photo 6. A pie chart generated by Grid Plot.*

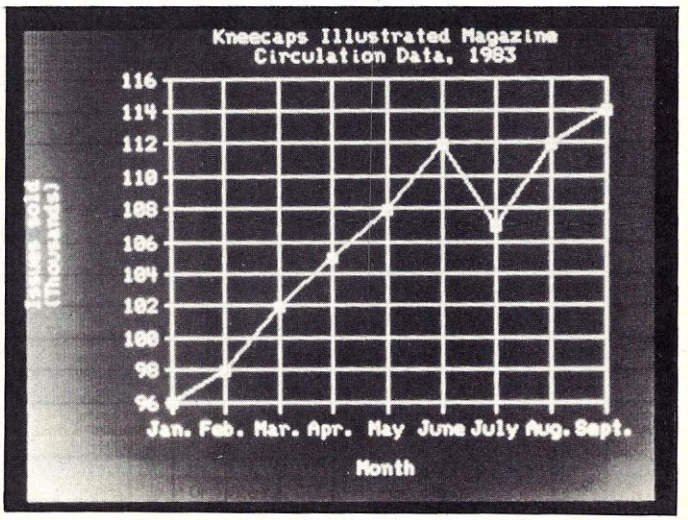



*Photo 7. A line graph generated by Grid Plot.*

## Grid Plot

Grid Plot is a business graphics program that lets you create bar, line, pie and scatter charts. Because, like all the Grid software, Grid Plot supports the 8087 math chip, it draws graphs extremely fast. Most charts appear almost instantly; extremely complex charts are drawn in about a second.

Grid Plot displays its data in a table that looks much like a spreadsheet. You can enter data to be graphed directly into Grid Plot, or you can transfer it from one of the other Grid programs. Then, using the program's Graph command, you select the rows and columns to be graphed, and the graph appears. You can switch to a different type of graph at any time using the Options command. Using the Headings command, you can specify up to five headings in different positions.

With the Properties command, you can choose from eight patterns, including slanted line, crosshatch, solid and so on, for representing your data on bar and pie charts. Eight line patterns are also available for line graphs. And, if you intend to print your final graph on a color plotter (the program supports several), you can choose from nine colors. Photos 6 and 7 show two sample Grid Plot graphs.

| Device Designations | Definitions |
|---|---|
| LPT1 | Equivalent to the MS DOS PRN designation. References the GPIB printer connector. This designation is the standard IBM name for the printer and has been added for IBM PC compatibility. |
| LPT2 | Equivalent to the standard IBM name for a serial printer. The serial channel defaults that apply in this application are: seven data bits, one stop bit, even parity, CTS handshaking during data exchange and 1200 baud (identical to the IBM PC default values). |
| COM1 | Refers to the asynchronous, serial data communication channel, labeled SERIAL or ACCESSORY on the Grid Compass's back panel. |
| COM1STAT | Provides control of the serial communication channel and obtains status information from it. |
| COM2 | Refers to the asynchronous serial data communication channel routed through the Grid Compass's internal modem, labeled LINE on the back panel. |
| COM2STAT | Provides control of the internal modem default settings and obtains status information from this data channel. |

*Table 2. Grid Compass additions to MS DOS devices.*

## Grid File

Grid File is a relational database manager that displays your data in a unique way. In Grid File, data is entered and displayed in a two-dimensional table, with each row representing a record, and the columns representing its fields (see Photo 8). When you set up a database, you use the Options and Properties commands to specify field names and widths, data types, and data alignment within a field. Field widths can be up to 50 characters long, and a record can contain up to 255 fields. The maximum number of records is limited only by available disk or bubble memory space.

You can scroll through a database either horizontally or vertically. Grid File can sort your database using up to six sort criteria, in either ascending or descending order.

You query a Grid File database using the Find command. The following types of queries are possible, in any combination:

- Exact (for example, searching for product number "2345-3," or customer "Maryellen Kelly")
- Range (for example, searching for all addresses with a zip code between 00000 and 10000, or all sales contacts

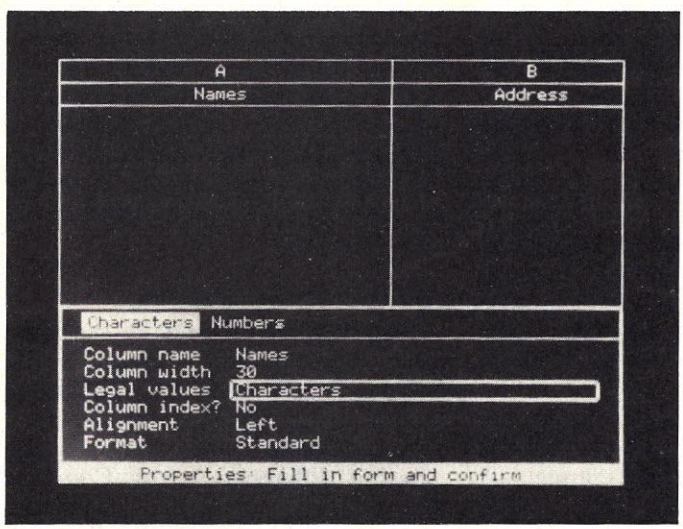



*Photo 8. The Grid File database manager. The properties of the Names field are being specified.*

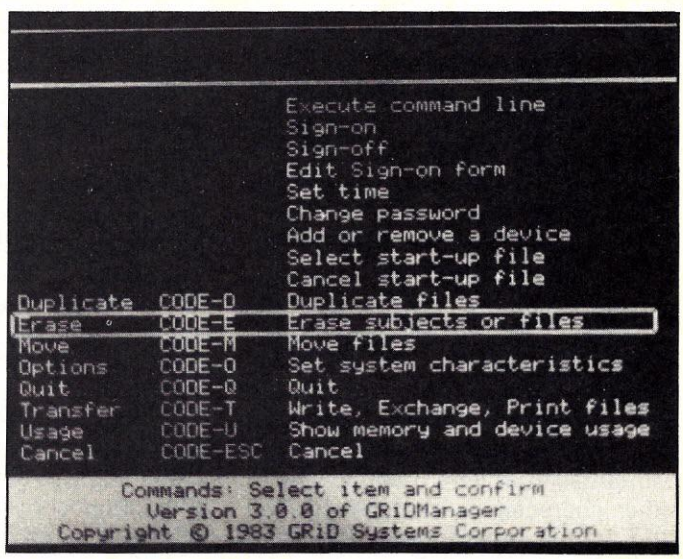



*Photo 9. Grid Manager's commands menu.*

with buying habits of more than $1000 per month)

- And (for example, searching for all employees that are under age 40 *and* earn more than $30,000 per year)
- Or (for example, searching for all customers who bought products in May *or* in July)
- Multi-item conditional (for example, searching for all products with a list price less than twice the direct labor plus indirect labor costs).

You can index any column that you expect to query often to decrease search times. Grid File lets you have as many indexed columns as you have columns in your database. Finally, the program has many of the intrinsic math functions found in Grid Plan.

**Other Software**

Although the five programs just described make up the major offerings from Grid, other packages are available. Grid Manager, included with the operating system, is a utility that lets you copy and erase files, sign on to Grid Central, format disks and bubble memory and perform other housekeeping tasks (see Photo 9).

Grid Term is a telecommunications and terminal emulator program that supports uploading and downloading, and has a 32KB display buffer that you can scroll through at any time, even when you're still on-line.

You can define the communications protocol (bit rate, number of data bits, parity and so on) using Grid Term's Properties command. The Access command presents you with what's called an access form, which you use to specify the remote system's phone number, the desired bit rate, what type of dialing to use (pulse or tone) and other information.

Other communications programs, designed more to emulate specific terminals for micro-to-mainframe communications, are also available. Grid 3101 turns the Compass into an IBM 3101 display terminal, model 2. The program supports asynchronous communication with a mainframe in either character or block mode. The Grid VT100 program lets the Compass emulate a Digital Equipment Corp. (DEC) VT102 terminal, the terminal usually used with DEC Vax and PDP-11 computers.

**Programming Tools**

Several languages are available for programming under CCOS: Fortran-86, Pascal-86, PL/M-86, and C compilers, ASM-86, a macro assembler and Grid Basic, an interpreted Basic.

All Grid-supported languages give you full access to the Grid user interface, meaning that your programs can contain file forms, common commands and so on. All languages also support the machine's 8087 math chip.

Grid Basic is just like all the Compass software: unique. One of its unique characteristics is its own user interface. For example, there's no "OK" prompt. The language automatically comes up in what's called programming mode—you're presented with a screen that's blank except for a line number with an outline box (called a statement field) after it. Programming mode most resembles what happens when you type AUTO 1000 in more "conventional" Basics.

To enter a direct command, you use the down arrow key to move the statement field to a point on the screen that has no line number. You can then type commands that are executed as soon as you press return.

You never have to type RUN or LIST in Grid Basic. To run a program, you simply type Code-R. To stop its execution, you press escape. To continue, you type Code-C. To see a listing, you simply press any key after the program has run or after you stop its execution and the listing appears.

Grid Basic is unique in one other way. It's utterly useless. The version I reviewed was so slow and bug-ridden that I couldn't even use it to perform some simple benchmark tests. The language crashed on numerous occasions and left garbage characters on the screen.

At first, I thought I had received a beta copy of the language or that the copy I had was defective. I downloaded another copy from Grid Central, but the same problems occurred.

Next, I called the Grid's customer support line, explained my problems and got this response: "That's a product we don't intend to support in the future. We've had some problems with it. The code isn't very solid."

I couldn't believe my ears! What about the customers who have already paid for it, only to find it useless for any serious applications?

Grid Basic is the only Grid-supported (?) language I reviewed. The other languages may be superb. I don't know. I do know that I can count from one to 5000 faster than Grid Basic can.

**Grid Central**

Located at Grid headquarters in Mountain View, CA, Grid Central is a kind of information service for Compass owners. You can get Compass software and updates through it, and you can use it as an extension of your Compass's memory to hold data files. The idea behind it all is to give you access to programs and data from any phone jack.

After my experience with Grid Central, I can see why Grid introduced the portable disk drive. Don't get me wrong: The *concept* of receiving all your software via modem is sound, and Grid Central does work as advertised. It's just that it's s-l-o-w. Downloading an average program takes about 15 minutes, and that's at 1200 bps.

Worse yet, the system doesn't check ahead of time to see if your Compass has enough memory to hold a given program. I spent 15 minutes (at prime time phone rates) downloading a program, only to get an error message telling me that my Compass didn't have enough memory to hold the file. To me, that kind of performance is unacceptable. If you're considering a Compass, consider the disk drive, too.

**MS DOS on the Compass**

Grid sells MS DOS 2.0 for the Compass. The operating system is the same as it is on most MS DOS-based micros, with only a few differences.

As mentioned earlier, the most noticeable difference is the Compass keyboard. Many special characters that are used in MS DOS pathnames and commands aren't supported directly by the keyboard. To obtain

them, your fingers have to go through some awkward, three-keystroke gyrations.

The bubble memory is designated as drive E, while the portable disk drive acts as both drive A and drive B. Other device designations are also different on the Compass. Table 2 lists the differences between normal MS DOS device designations and Grid's MS DOS designations.

Another difference concerns the clock/calendar. When using MS DOS on the Compass, you just press return in response to the MS DOS time and date prompts, since the calendar is battery-powered and retains the correct time and date when the machine is shut off. If you need to change the time or date, you use a separate utility program provided on the MS DOS system disk.

I looked at Grid versions of Lotus 1-2-3 and dBase II. Grid's 1-2-3 is tailored to the Compass, all the way down to its documentation and tutorial disk. 1-2-3 performs beautifully on the Compass, especially when you put it and its help files into bubble memory. Unfortunately, the program doesn't support the Compass's 8087 math chip. Spreadsheet calculations are still about one-third faster than they are on an IBM, however, thanks to the increased speed and throughput of the Compass's 8086 CPU.

dBase II is the same on a Compass as it is on other MS DOS machines. It performs better when you put its overlay file and its help file into bubble memory, although the help file eats quite a byte of space. Like 1-2-3, dBase II doesn't support the 8087 math chip, though it does run somewhat faster on a Compass.

Besides 1-2-3 and dBase II, other MS DOS-based software is available for the Compass, including Multiplan, WordStar, R:base 4000, Condor and TK!Solver. (TK!Solver does support the 8087.) Several Microsoft languages are also available, including Basic and the Basic compiler, a macro assembler, Fortran, Pascal and Cobol.

### Documentation

I have one good thing to say about the Compass documentation. The plastic reference cards that snap in place above the computer's keyboard are a great idea.

The rest of the documentation is disappointing. It's thorough and clearly written, but poorly organized. In the Management Tools manual, for example, the commands common to all the Grid programs are explained in their own chapter. This saves space and paper, but it makes it difficult when you're in the Grid Write section of the manual and every other sentence refers you to the common commands chapter.

The documentation is also ugly and unwieldy. Except for a nice, glossy "Getting Started" manual, all the Compass manuals were printed single-spaced by a dot matrix printer and printed on thick 8½ × 11 stock. This combination makes the Compass manuals weigh about as much as the Compass itself. I don't know about you, but when I pay six to eight grand for a computer system, I want typeset manuals.

### Conclusions

Well, what do *you* think? Is the Compass worth $6000? I'm not sure. On one hand, the machine uses technology that's currently very expensive. Apparently, no other manufacturers have thought the Grid's market niche big enough to be worth going after; there's no other computer on the market like it. The Compass is gorgeous, its display is a dream and the Grid integrated software is extremely easy to use.

On the other hand, my experience with Grid Basic and with Grid's support line made me a little wary. Although the hardware performed perfectly and I didn't encounter any problems with the other Grid or MS DOS software, having a final version of a programming language crash more often than not shook my confidence. And, if I were a customer who had just bought a Compass and its Basic, I wouldn't appreciate hearing a customer support person say, "That's a product we don't intend to support in the future."

My conclusion is this: If you need well-integrated productivity software in a portable package, if money is no object and you want to impress people, get a Compass. But if you intend to do any serious programming, investigate any Grid-supported language thoroughly before you buy.

But if what you want is MS DOS in a portable package, and if money is an object, consider a PC portable clone or even a Sharp PC-5000 or the new Hewlett-Packard HP-110. Your computer may not turn as many heads at the next board meeting, but you'll get solid performance at a more reasonable price. Not many people need more.■

*Address correspondence to Jim Heid, c/o Microcomputing, 80 Pine St., Peterborough NH 03458.*

### A Capsule Look At the Grid Compass 1101

**Price**
$6795.

**Manufacturer**
Grid Systems Corp., 2535 Garcia Ave., Mountain View, CA 94043.

**Operating System**
Choice of proprietary OS and integrated software or MS DOS 2.0.

**CPU**
Intel 8086 with 8087 math coprocessor.

**Memory**
384KB bubble memory; 256KB or 512KB of RAM (depending on model).

**Display**
80 × 24 electroluminescent flat panel; six-inch diagonal screen; 320 × 240 pixel bit-mapped graphics resolution; 66 Hz refresh rate.

**Keyboard**
57 keys, including four cursor control keys.

**Input/Output Ports**
One RS-232C/RS-422 serial port; one GP-IB (IEEE-488) port.

**Power Requirements**
110 or 220V ac, 50 or 60 Hz, 60 watts.

**Physical Characteristics**
15 inches long, 11½-inches wide, two inches high; ten pounds.

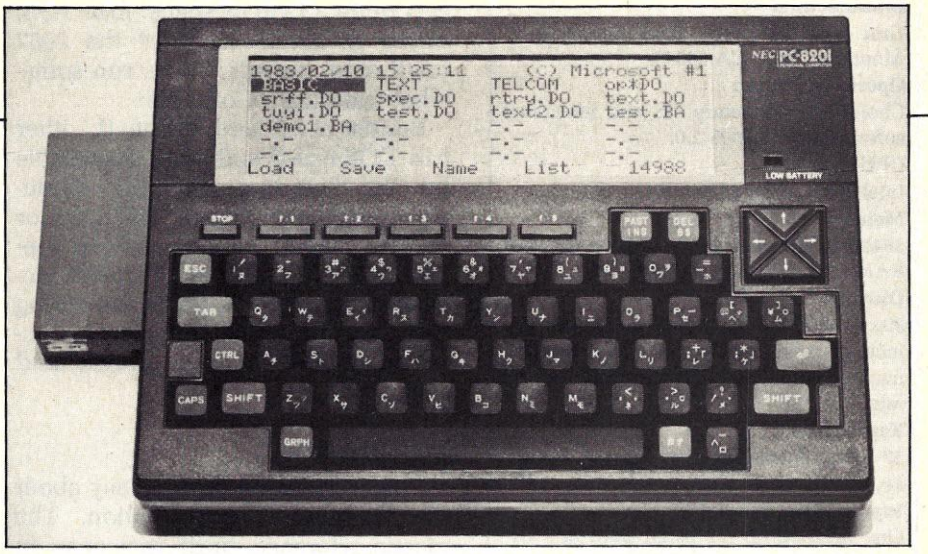
**Other Features**
Internal clock/calendar, lithium battery powered; internal 1200 bps modem.

**Optional Accessories**
Portable disk drive ($1195); 10MB hard disk/340KB floppy disk subsystem ($4100); file server/networking system ($10,500).

**Optional Software**
Grid integrated management software ($940); MS DOS 2.0 ($150); Lotus 1-2-3 ($495); dBase II ($695); Multiplan ($250); WordStar ($495).

# The NEC— Not Just Another Micro

By Ray Albrektson




I frantically racked my brain for an easy way to tell my wife that I had bought another computer ("What!? *Another* computer?") and still preserve our marital harmony. My opening words were interrupted as she caught a glimpse of what I was pulling out of my suitcase—a NEC PC-8201A.

"How cute! Is that for me?" she burbled, turning it on and beginning to experiment. I began my pitch about 64KB internal RAM, built-in text editor and modem program, fail-safe file management and optional RAM cartridges, but my wife wasn't listening.

Five minutes later she had figured out how to use the text editor and had written me a very romantic welcome home note. Was this the same woman who took three months to master a four-key boot sequence on my stay-at-home computer? That should tell you something about how easy this notebook-sized portable from NEC is to use.

### Another Radio Shack Workalike?

On first spying this NEC in a computer center showroom in Singapore, I immediately thought of the Radio Shack Model 100 portable. The similarities aren't just superficial—the two are about as similar as a Dodge and a Chrysler. There are differences—and some are major—but the overall layout is comparable.

The PC-8201A comes with a vinyl slipcase, a cable for connecting a cassette recorder for mass storage, three books and a cassette tape. The PC-8201A user's guide is a thorough introduction to the use and care of the NEC and covers the operation of the built-in text editor (Text) and telecommunications program (Telcom). The second book covers the Microsoft Basic that's used in the NEC, and the third book, called a personal application kit guide, is a guide to the programs on the cassette tape. All of these books are written in an oddly Oriental way but are reasonably understandable. The documentation wins no awards for completeness, however.

On the hardware side, the big, bold 40-character by eight-line screen is a delight to behold. The characters are formed from a five by seven matrix, but descenders are formed by intruding into the between-line space. This

*It may look a lot like the Radio Shack Model 100, but the NEC PC-8201A has a personality all its own. With a built-in text editor and a modem program, the author reports that the NEC is a go-anywhere computer that can do it all.*

works well unless the descender on your y ends up directly over a capital T—in that case the interlinear separation is pretty ragged. In scanning the last two dozen lines of text, however, this didn't occur even once. (Naturally, this article was written from start to finish on the NEC.)

**Love This Shape!**

The keyboard layout is standard Qwerty with a more-than-acceptable feel. One big problem with most portables (beginning with the Epson HX-20) is marginal key response for touch-typists. The NEC keyboard has a substantially different feel from both the Epson HX-20 and the Model 100, which should influence your choice. The keyboard is free from any form of friction, and you'll feel a very light spring pressure until you reach the end of key travel.

However, the spring pressure isn't quite strong enough. Semicolons crept into my text and at first I thought it was a glitch of some kind. I realized that my right pinky occasionally bore down on its rest key (the semicolon) enough to fire it.

I was delighted to discover no trouble with key bounce or lost characters. The NEC keyboard performed flawlessly. The NEC designers could have introduced some sound-deadening material though—the clickity-click is substantial. They were astute enough to put tiny raised dots on the F and J keys to satisfy the touch-typing fanatics.

Those same fanatics will love the wedge shape of the PC-8201. The slight incline comes miles closer to a standard typewriter shape than the basic slab-shaped portable. The wedginess of the NEC results in a bit better screen visibility than the fairly flat Epson HX-20 or Model 100.

The cursor control keys are very nice—a square cut into fourths on its diagonals forms four keys that naturally guide the cursor around the screen. If you can't stand taking your fingers off the keyboard, you can use control keys for cursor movement. I discovered that I can even operate the cursor keys with my right pinky without taking my hands from the keyboard.

Other miscellaneous keys include a paste-insert key (used with the text editor) and a key called graph that enables you to display custom-designed characters. There is no numeric keypad, not even the makeshift kind derived from making the UIOJKLM keys serve as a numeric keypad. There are five user-programmable keys that do double duty as ten when shifted. The labels for these keys are normally displayed on the eighth screen line, and their contents can be easily changed. When the shift key is pressed, the labels on the eighth line all switch to their shifted alternates. Finally, there is a stop key, which generates a control-C.

**The Connector Zoo**

Before leaving the outer crust and taking a peek inside, note that the computer's back edge is chock full of sockets and connectors—seven different varieties plus a switch. These include provision for a cassette recorder to use for mass storage (eight-pin din socket), an RS-232C port using a female DB-25 connector, a parallel port outlet for using a printer, a DB-9 connector for a bar code reader and a jack for an ac adapter.

The two remaining sockets are really strange ones, called "eight-pin DuPont Berg modular jacks" in the manual. Another just like it has six pins. This latter socket is more familiar as a phone jack, except most phones only use four of the six slots. These jacks support serial ports, but NEC didn't see fit to inform the user as to how these ports might be used. The user's guide coyly refers to these ports as being for "further expansion." An NEC technician in Singapore told me that these are intended to support a modem (which is not built-in, unlike the Model 100) and a floppy disk system. All of the plugs are protected with removable dust covers.

**Where to Cram Extra RAM?**

On the bottom of the two-tone ivory and beige shell is a three by seven-inch panel that allows access to all the ROM and RAM chips. The PC-8201 comes with 32KB ROM and 16KB RAM as standard equipment, but that leaves room for another 32KB ROM chip (perhaps containing a disk operating system?) and 48KB more RAM.

This means that the PC-8201A can be expanded to a full 64KB of RAM—twice the expansion potential of the Model 100. A spring-loaded door on the left side also holds an optional 32KB RAM cartridge. This can be removed and exchanged at any time with no data loss.

There is a catch—the memory operates in banks of 32KB, which limits your maximum file size to something less than that due to the operating system overhead. Some marginally useful utility programs are provided to allow a Basic program in one bank to access files in another bank; more about that later.

The extra RAM comes in 8KB increments and consists of four tiny 2KB chips mounted on a 28-pin header. The NEC expansion memory appears to be identical to that used in the Model 100. The expansion chips I bought (in Hong Kong) came with instructions in Japanese only, but the pictures were enough to give me hope of correctly installing them. However, I got a sweaty feeling when I remembered that NEC charges

around $75 per chip and insists that dealers must install them or the warranty is voided!

This memory is powered by four AA cells backed up by an on-board rechargeable battery. A warning light tells you of a failing battery. If you ignore the warnings, the NEC will shut off in self-preservation. When you replace the batteries, it comes up right where it shut down—even if it happens in the middle of printing a file.

### Hard Knocks For N-82 Basic

The Basic interpreter (called N-82 Basic) is a product of Microsoft and is a good example of maintaining standard features of Basic while taking advantage of some of the PC-8201A hardware features. For instance, there is an On Com Gosub command that provides for processing interrupts generated by the arrival of the character at the RS-232C port. This interrupt capability can be disabled using the Com Off command. Somewhat less useful is a full set of bit-comparison commands that are very powerful but are unfamiliar to many programmers. These include Not, And, Or, XOR, IMP and EQV.

What is totally inexcusable is the way the Basic designers made device-independent programming practically impossible. For instance, only the RS-232C port and cassette have device names (COM: and CAS:, respectively). Device names are not provided for the bar code reader, parallel port, two mystery ports, screen or keyboard. This means that you need to type LPRINT A$ if you want to send A$ to the parallel printer port; PRINT #1, A$ to send it out the RS-232C port; and PRINT A$ to send it to the screen. This is such a drawback I thought perhaps the manuals were at fault for not listing the device names, but they just aren't named. One of the sample programs in the Basic manual actually refers to a SCRN: device. Obviously, this program was written to run on another NEC computer using a similar (but not identical) version of Basic.

### A *Real* Operating System

When you switch on the PC-8201A, the screen display is very similar to the Model 100's. The three ROM-based programs appear in the first three positions on the menu, and the filenames of the other programs and files follow. The function keys control all the operating system functions, such as deleting or renaming a file, saving and loading to cassette or dumping a file to the parallel printer port. This last option does rudimentary word-wrapping but doesn't allow for the possibility that your printer may need some set-up commands. If you have a serial printer, this command isn't very useful, since the output can't be directed to the RS-232C port.

The operating system allows you to select one file as a "command" file, to be executed as soon as the power is turned on. You can't bypass this feature if the command file is active. The user's guide suggests using it to monitor a password; however, anyone but a hopelessly naive user could push the stop key and list the password program!

> The NEC designers made it impossible to lose a file. Hit control keys—even push reset! Whatever you were working on will still be there when you turn the computer back on.

The designers of the PC-8201A did a great job in making it practically impossible to lose a file. Do what you like. Turn it off in the middle of an editing session. Hit control keys at random—even push reset! Whatever you were working on will be there, just as you left it, when you turn the computer back on.

The built-in software includes a Basic interpreter, the text editor and Telcom, a telecommunications program. These are very similar to the programs of the same name in the Model 100, but not identical.

Another oversight is the inability to test whether or not a particular dot on the screen is off or on. The graphic commands are rudimentary: Pset turns a dot on and Preset turns it off. But to test a dot, which you would need to do in a screen-dump program—well, you're just out of luck. No such command is included. There doesn't seem to be any simple way to do it using peeks either.

Other convenience features that I wish the designers had included are the Auto command for creating line numbers and a debugging tracer (TRON and TROFF in some versions). The lack of a VARPTR command will make it difficult to interface some machine language programs to Basic.

Editing Basic programs is a snap. At the Basic command level you can just list the line you want to edit, type over, insert or delete as necessary, and enter a carriage return to tell Basic that you have finished with that line. With one touch of a key you can move part or all of the program into the Edit program and have access to all the resources of the text editor. I found the search function particularly useful in following variables through a Basic program.

All things considered, the PC-8201A version of Basic is more than adequate, but the Model 100 version of Basic (also by Microsoft) is far superior.

### The Text Editor: Simple and Functional

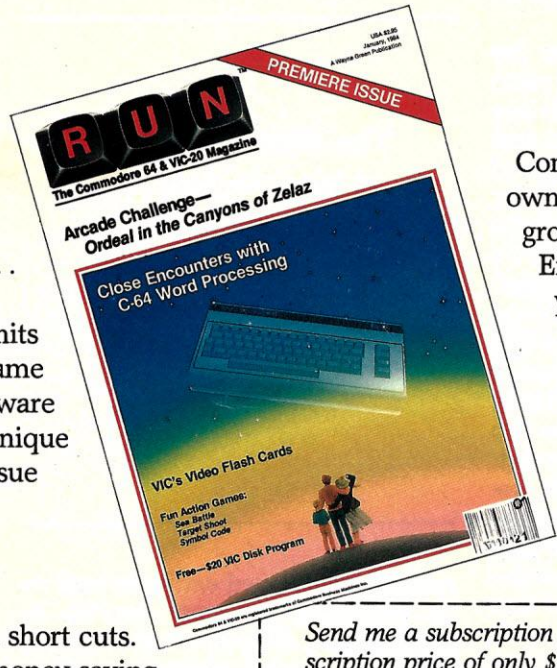
The Text program is very nice, but it is a text editor, not a word processor. If you are used to a do-everything word processor that accepts text, displays, formats and prints, you may have higher expectations than the PC-8201A can deliver. What Text does deliver is a fast, flexible way of entering and editing text, including the ability to move blocks of text.

Text opens by asking for a filename. If it doesn't find the one you type, it creates one and clears the screen for you to begin. When you get near the end of the 40-character line, keep on typing—the PC-8201A word-

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wraps as required to keep text readable.

Text is different from most bottom-line editors in that it is never in a type-over mode, but is always in an insert mode. This makes correcting errors a two-step process: insert the new, delete the old. This approach may be more of the same fail-safe philosophy built in to every aspect of the PC-8201A. The designers intend that you never accidentally lose even a single character.

Moving through the text is a breeze with the cursor keys. Using them with the shift keys moves the cursor up and down a page at a time and right and left a word at a time. Using the control key with shift arrows takes the cursor to the top or bottom of the file and to the left or right extremes of each line.

The function keys implement the search function and the cut and paste editing features. The F1 (search) key seaches for a given piece of text and F2 (next) finds the next occurrence of that word. The F3 key (select) allows you to highlight in reverse video the text to be moved or deleted. The F4 (cut) key then moves the highlighted block into a buffer in memory and deletes it from the text. The paste key puts that block back into the text at the cursor location. The F5 key (copy) moves the highlighted text into the paste buffer without deleting the text.

The contents of the paste buffer remains intact until replaced by something else. This can cause your precious memory to seemingly evaporate! If you moved a big hunk of text before leaving Text, that same hunk sits forever in the paste buffer, clogging up memory until you next use the select and cut keys. Before leaving a file, I usually hit those two keys just to be sure that the paste buffer is empty.

Text is an editor only, so formatting and printing your files is up to you. A short formatting program, included with the application software, can serve as a nucleus for developing your own formatting program.

### Getting the NEC to Talk...

The Telcom (telecommunications) program is ideal for modem communications with other computers and makes up- or downloading files a snap. The RS-232C port of the PC-8201A can be set to use a diverse combination of stop bits, bit rates and so on. Within minutes of unpacking the NEC, I had it swapping files with other machines. Many buyers of notebook-style computers already have access to other more massive computer systems, either at home or at the office. In my case, I use the NEC as my go-anywhere computer, and at the end of the day or when I return from a trip, I just upload from memory or cassette files to my Heath H-89.

### A Boat Anchor With No Documentation...

The PC-8201A comes with the manuals mentioned earlier as well as an N82-Basic summary booklet. A cassette tape of application software (called a personal application kit) is included. The best things in it are the machine language routines for using bar codes. Since the memory is subdivided into 32KB hunks, it would be nice if a Basic program in one bank could access data in another. A bank-accessor program that can do just this is provided. It has one big drawback, though—it eats up almost 12KB of memory in each bank. Another program copies files from one bank to another.

The Telcom program is ideal for modem communications with other computers and makes uploading or downloading files a snap.

Other programs included are a linear-forecasting program, a loan evaluator, an investment portfolio analyzer and a program to help you define the 61 characters that can be displayed using the graph key. A few games, a music program and the text formatter already mentioned round out the offerings. I wish they had included some kind of file status program. There is no way to determine the size of a file.

### A Basic-only Computer?

What are the prospects for serious assembly language programming on the PC-8201A? The potential is high. Because the CPU used in the PC-8201A is an 80C85 (a CMOS version of the 8085), code for this lap-hugger can be written and assembled on any machine that can run an 8080/8085 assembler or cross-assembler. The resulting file could be downloaded to the NEC, loaded and run. The catch is that the hardware information required to write any significant machine language programs is unavailable.

The documentation provided with the machine doesn't even identify the input/output port addresses, much less the entry points of important ROM routines, such as the ones relating to screen control and file management. When I asked a technical representative of NEC in Singapore if I could have some of that information, he waved a manual at me with "Confidential" stamped all over it. "Very secret!" was all he would say on the subject of ROM addresses. The bottom line is that the PC-8201A will remain a Basic-only computer unless NEC wises up and releases the required information, or some smart hackers form a user's group and dope it all out for themselves.

In the meantime, Little Nic serves as the family go-everywhere computer. From recording who gave what around the Christmas tree to taking research notes in the library stacks, the PC-8201A can do it. It does it all with a big screen, a professional keyboard and a massive memory. The only problem is, my wife still thinks it's *her* computer! Well, I guess we could afford two....■

*Ray Albrektson (ACPO Box 51, Quezon City 3001, Philippines) is a member of the extension faculty of the International School of Theology in Baquid City, Philippines.*

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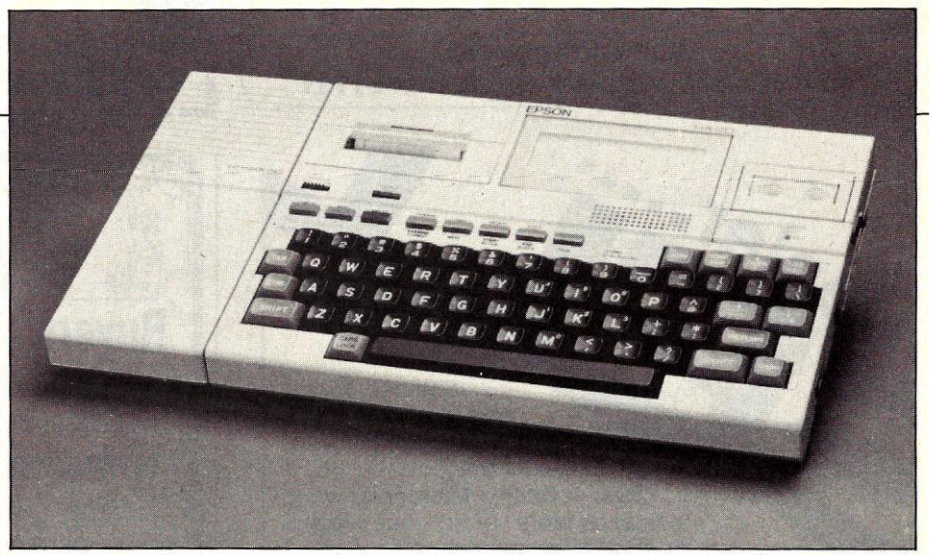
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# HX-20 Software:

## The Ski's the Limit
## or
## The Missing Link

By Duncan Kelly



For what seems an eternity, owners of Epson's HX-20 lap-sized portable computers have waited for applications software, watching jealously as other portables entered the market with larger displays, built-in modems and built-in programs for telecommunications and word processing.

As a matter of fact, it's remarkable how long it *did* take Epson, who introduced the first viable lap-sized computer into the American market, to catch up with those that entered the market later.

Despite its slow uptake on the competition, Epson's HX-20 has several points in its favor: built-in microcassette storage, memory and a microprinter. Other than a few short game programs and home applications, though, the HX-20 remained for some time a machine for writing programs, not using them.

Two software products released by Epson may help to recover some of its market share: SkiWriter, a word processing package, and EpsonLink with Text Editor, a telecommunications program with a typewriter-style text editor.

The evaluation package provided to *Microcomputing* included an HX-20 with SkiWriter in ROM, a microcassette drive, a microprinter and an expansion unit. EpsonLink was provided on a ROM chip, installed in the expansion unit. In addition, Epson provided its CX-20 battery-powered acoustic coupler modem.

Note: If you don't have an expansion unit, you can't have both SkiWriter and EpsonLink installed permanently on your system in ROM. You may purchase EpsonLink in a ROM pack and load the program in memory—provided that you title the program according to the instructions. The loaded program survives even without the power on; unfortunately, it won't survive a reset.

### SkiWriter

SkiWriter, the word processing package (developed by SkiSoft), makes good use of the HX-20's small screen, printer and microcassette. It operates much like a word processing program on a full-fledged desktop system.

In addition to an insert and replace mode for normal text entry and editing, SkiWriter also allows you to

*Stalwart HX-20 fans take heart: It's been a long wait, but Epson has finally introduced two software packages, SkiWriter and EpsonLink, to enhance the portable's performance.*

mark blocks of text for deleting or copying, to perform find (but not replace) operations, to print either on the microprinter or on a serial printer and to save on (and retrieve from) microcassette or standard cassette.

The performance of SkiWriter's editing features is excellent. It allows simple entry of text without cramping your style. Its automatic word-wrap allows you to enter text without the disruption of having to hit the return key.

The characters appear rapidly on the screen, and even carriage returns and scrolling won't slow you down. A special return character indicates hard carriage returns on the screen.

SkiWriter has its quirks, though. For example, simple backspacing doesn't delete text. The delete key deletes only to the right of the cursor.

**Screen Limits**

What's unnerving about using SkiWriter isn't directly a problem of the software. It's HX-20's screen. The HX-20's 20-character screen is one of its most limiting factors, a major difference between the HX-20 and its competition. Sadly, it limits the power of the machine's application software as well.

In SkiWriter, you don't really know how far into a paragraph you are, nor can you tell where you are in terms of the whole document. A permanent status line would be only a small help because it would take up another of those precious lines. Also, a status line can't give you a quick glimpse of the paragraph as a whole.

To handle reasonably sized documents, SkiWriter latches onto a substantial amount of memory. This limits you a bit if you like to use other programs in memory. Because of SkiWriter's affinity for memory space, you can't switch directly from SkiWriter to EpsonLink. After saving the files in memory, you must go into Basic and perform a MEMSET command.

**Save on Tape**

Unlike its competitors, the HX-20 doesn't provide a simple way of handling more than one text file in memory. Therefore, if you want to edit a second document, you must first save your current file on tape.

The tape storage system used by SkiWriter is sensible: the buffer is of a limited size. So that SkiWriter can manipulate the files, a fixed amount of space is set aside in the buffer. SkiWriter sets specific tape locations for file storage so it knows where on a sequential microcassette or cassette to store and retrieve the files.

SkiWriter allocates a specific location on a cassette for each document number. A microcassette holds up to three SkiWriter files on a side; a standard C-60 cassette holds up to six files. In my experience, this standard file size system hasn't proved to be a problem. It seems inefficient for cassette space, but it's probably more efficient in terms of memory (can you imagine trying to note down the exact file location of each of your small and large files—or worse, going through a sequential search of an entire microcassette just to discover that your letter to Aunt Mildred is on another tape?).

With the standard file size, you store your document on tape as Document 1, 2 and so on. The HX-20 will wind (fast forward or rewind) to the appropriate location on the tape and then record at normal speed. The loading process works similarly.

Writing a long document (say five single-spaced pages or more) isn't particulary practical on the HX-20. The tape storage allows you to store as many files as your tapes allow, but all the loading and saving becomes pretty cumbersome for long documents. And remember, you can only edit one bufferfull at a time.

**Printing Process**

Printing with SkiWriter is a simple process—especially if you use your HX-20 to print notes or lists on its microprinter. When you select the print option, you can choose to print on either your microprinter or on an external printer. If you select the microprinter, it starts right up, printing away on its shopping-list-sized paper.

Printing longer documents to an external printer and transmitting by printing to another computer with SkiWriter is a little more troublesome. You can't insert any special codes in the text other than a page feed. SkiWriter disables the control key as well as the graph key. If you want to use special printer features, such as boldface and underlining, you'll have to upload to your desktop system first and insert the codes through another word processing program. A program in the back of the SkiWriter manual sets the pre- and post-print buffers for external printer controls, but it's only effective for global sorts of printer codes, not if you want only one word to appear in boldface.

Uploading to another computer is somewhat difficult if you try to use SkiWriter's print function to "print" a file to another computer. You must first type a Basic program to set the HX-20's pre- and post-printer buffers, so that you're sure the HX-20 will transmit a Control-Z (end of file character). In addition, you must perform a MEMSET (after first storing your document and exiting SkiWriter) to run this little Basic program, then go back into SkiWriter, reload the document and print.

Moreover, there's another program to type in that handles changing the HX-20's parity, protocol and bit rate to match the receiving system. With

SkiWriter in ROM, both Basic programs can remain in one of the HX-20's protected program areas. To run them, you need to save your document on tape and delete the document from memory in many cases. All in all, communicating to an external device with SkiWriter is downright difficult.

**Take It Easy**

SkiWriter's documentation is easy to follow and easy to understand. In addition, several appendixes have annotated Basic programs for setting the RS-232C port, changing the print buffers and saving and loading on an external cassette.

Overall, SkiWriter is a good word processing package for the HX-20. Most of the program's limitations are caused more by the hardware than by the implementation of the program. Also, when SkiWriter is used with EpsonLink, many of the communications problems are averted.

**EpsonLink with Text Editor**

First there was the HX-20...then came SkiWriter...now, there's EpsonLink. EpsonLink handles an extremely important application for a lap-sized computer: telecommunications. EpsonLink takes this process one step further by combining a powerful communications program with a simple text editor.

There's no point in comparing the EpsonLink Text Editor with SkiWriter. They aren't intended to perform the same functions. SkiWriter works like a word processor, and EpsonLink's editor works like a typewriter. Most people use both—each for its best functions.

I use the typewriter for short notes and letters and the word processor for larger, more involved documents that I want to massage into an appropriate form. Just the same, EpsonLink is designed for the short communiqué (although you can string together several, if you want), and SkiWriter is better suited for medium-sized documents that you'll want to change around or rewrite.

Text Editor's edit buffer isn't small, however. Although its manual states that the buffer size varies according to whether you've loaded EpsonLink from a ROM pack or had a ROM installed permanently, the buffer size in *Microcomputing*'s review unit stays at about 200 lines by a maximum of 90 characters. In addition, you can string together several files from the microcassette when you're transmitting or printing.

Entering text on Text Editor is just like typing. When you near the end of the margin (you can set margins from 20 to 90 characters), a tone sounds. When you reach the end of the margin, the program won't accept any more text until you hit a carriage return.

Text Editor's manipulation of blocks of text is spartan at best. You can only insert and write blocks of text from tape (by line number); you can't move a block within a file without first saving the block on tape and then reading it back in at the right location.

EpsonLink handles an extremely important application for a lap-sized computer: telecommunications.

One additional note: EpsonLink's Text Editor doesn't read SkiWriter files properly. It truncates all lines at the margin setting and ignores SkiWriter's soft returns. So, if you try to load a SkiWriter file into EpsonLink's editor, each paragraph appears as if you typed it on a typewriter and hit the margin. Text Editor ignores all characters beyond the margin limit.

If you only use your HX-20 to take notes, or for short letter writing and on-line communications, you don't need much more. On the other hand, if you're a writer and plan to compose long documents, you'll find that SkiWriter is more suited to your needs.

Try to think of Text Editor as a little bonus that comes with the communications package, specifically designed for you to compose short documents for printing or transmission via the terminal emulator.

**Advanced Package**

The terminal emulator is the key feature of the EpsonLink package; and it is, indeed, an advanced communications package.

The terminal emulator allows communication between computers via phone lines or by direct connection. With EpsonLink, you can easily modify communications parameters, communicate at speeds ranging from 110 to 4800 bps, download and upload to external systems using the microcassette, and transfer files using Christenson block protocol (especially effective for large files). In addition, the block protocol is also the protocol used by Epson QX-10's Valdocs mail functions.

EpsonLink, paired with Epson's 300 bps battery-operated CX-20 acoustic coupler or another modem, makes the HX-20 an effective terminal, allowing on-line communications, the capture of information from a remote source, the manipulation of the data and then the transmission of the information to another source.

Once you select the terminal emulator option from the EpsonLink main menu, you are on-line. From the on-line condition, you alter your communications setup parameters, including bit rate (110 to 4800 bps), number of stop bits, parity, half or full duplex, character length, automatic linefeed and the decimal ASCII code for the pause/continue (XOFF/XON) characters. After you set your communications parameters, you're ready to connect to another computer or to an information service such as CompuServe or The Source.

Other features add even more power to the terminal emulator. While connected to another personal computer or to an on-line service, such as CompuServe or The Source, you can record incoming information and transmit outgoing information with your built-in microcassette. This is extremely useful for saving large blocks of information when you just don't want to waste time (on-line, time is money) trying to digest all of the information at once. This is also helpful if you use one of the electronic

mail services. You can create your message using the text editor and then send it along, rather than use one of the awkward on-line editors to write the message.

### Plus Features

An extremely effective feature of EpsonLink is the block receive/transmit function. This helps ensure the integrity of transmitted data for anyone who sends large files over the phone or by direct connection.

EpsonLink's block receive and block transmit functions use what's known as a Christenson protocol. It verifies the data sent against the data received by calculating the sum of the bits in each group (or block) of characters transmitted, and then checking to see if that sum corresponds to the sum calculated after the data is received. If the sums don't match, the originating system transmits again until the sums match or until the program gives up on the whole transmission.

Block protocol works effectively only if both ends support the protocol you're using. Christenson protocol is the same protocol used by the public-domain X-modem software as well as Epson's QX-10 Valdocs superb mail function—great news for Epson devotees.

One additional EpsonLink feature is the printer/modem toggle. This changes the output device from modem to printer and printer to modem without disconnecting communications, which lets you jot out a note on your microprinter while remaining on-line. Unfortunately, the feature doesn't let you print information as it's received from an external source.

All EpsonLink features operate as promised—quite well, in fact. People who want to transfer documents between the HX-20 and larger computers should be quite pleased with this product. I wrote the bulk of this review with SkiWriter, then transferred it to a desktop system—quite easily—using EpsonLink on the HX-20 and X-modem on the receiving end.

The EpsonLink documentation is also quite good. It contains all pertinent information; the descriptions of the more complex topics are quite clear. As with SkiWriter, plenty of appendixes with Basic programs and reference material are provided. The table of contents and index allow you to locate the material easily.

### Again, the Screen

Even the best of features offered in the EpsonLink package can't supersede the inherent limitations of the hardware. It's virtually impossible to read anything coming over the line to the HX-20 at 300 bps if it exceeds the HX-20 image area of 20 characters by four lines. It's pretty frustrating when the only elements visible on a menu are the last item and the words Key <S> Or Enter To Continue. Changing the HX-20 screen settings from 20 characters by 80 lines to 80 characters by 20 lines doesn't help a bit. It's a matter of preference: Do you like to have the text spill off the top of the screen or off the side?

You *can* use the pause/continue button to stop and start the scrolling while you go back through the screen buffer to review what was sent. Also, some of the information utilities allow you to change your terminal parameters, which helps some. Either way, you're lengthening connect time and wasting money.

### Bottom Line

Epson's applications software appears to be designed around the computer; the computer itself wasn't made with these specific applications in mind, as was the competition's. The software just has to make the best of it. The result is a pair of application programs and a computer, each with its own merits. However, the design of the computer hinders the applications programs, and, in concert, the applications programs step on each other.

I'm not sure that the benefits of these programs would convince me to go out and buy the HX-20; but for HX-20 owners who've held out for SkiWriter's and EpsonLink's release, these programs perform as advertised and make the HX-20 a more useful product. That's what you've been waiting for.■

*Address correspondence to Duncan Kelly, c/o Microcomputing, 80 Pine St., Peterborough, NH 03458.*

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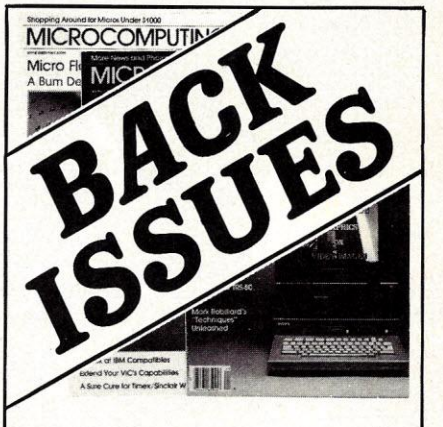
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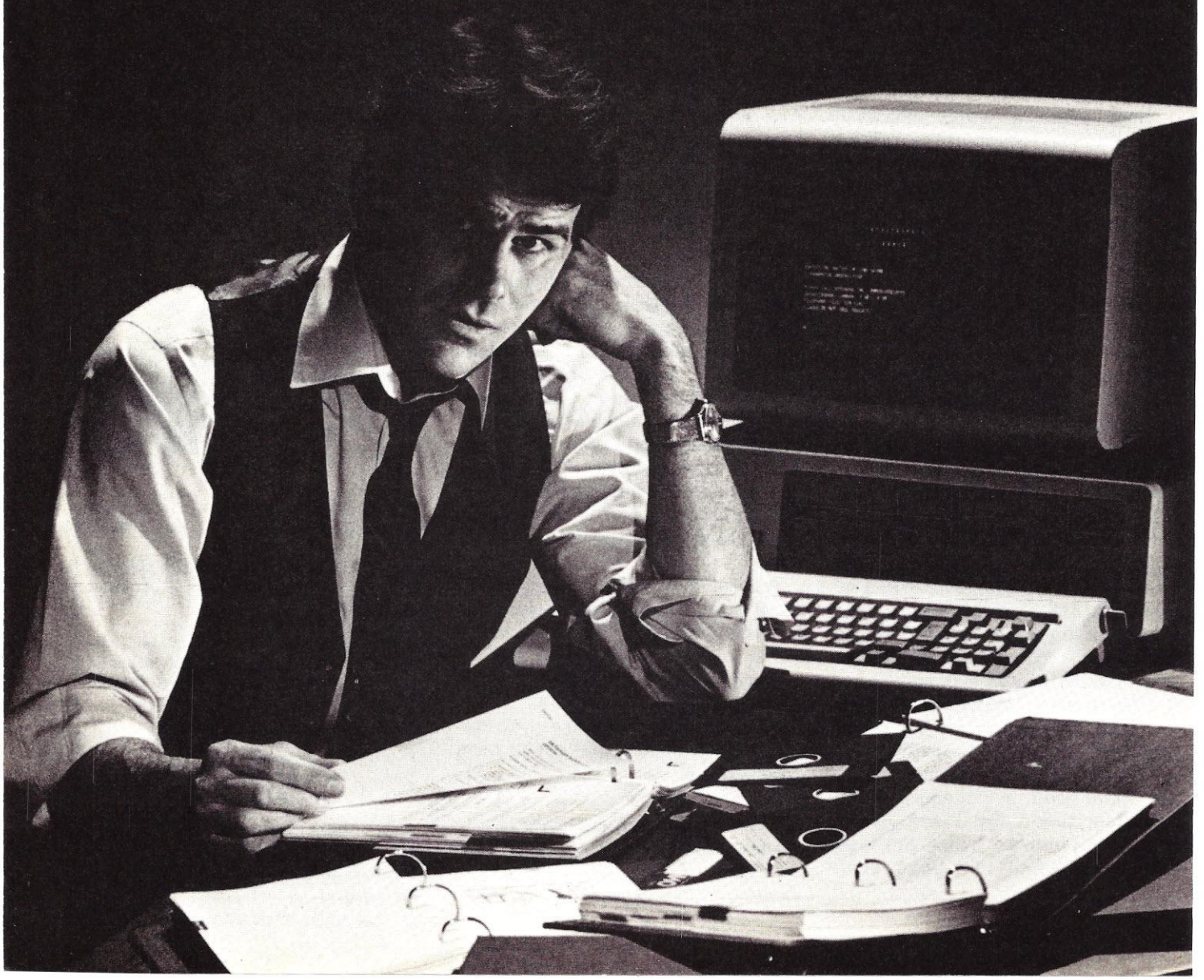
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# The Xerox 1810 Overture— Without the Fireworks

By Eric Grevstad
Senior Writer



X is the unknown factor, and the Xerox 1810 is the wild card, if not the joker, in today's deck of portable computers. Billed as an "office in a briefcase" by Xerox and its OEM manufacturer, Sunrise Systems, Inc. of Carrollton, TX, the 1810 combines some impressive desk accessories (appointment calendar, speakerphone, microcassette recorder) with respectable credentials as a portable micro (64KB RAM, 80-column LCD display). It would be terrific if it worked. Unfortunately, some of its good ideas are so awkwardly executed as to be unusable.

The Xerox isn't a dazzling design technically; it has a low-power, eight-bit CPU (the NSC 800), 64KB dynamic and 16KB static RAM and 32KB ROM. Mostly, it's a cross between the two lap-sized pioneers, the Epson HX-20 and Radio Shack TRS-80 Model 100: there's the Epson's microcassette for mass storage, joined with the 100's multispeed modem and similar built-in software for word processing, communications and scheduling.

However, the Xerox beats both of its progenitors in input/output; besides Centronics parallel and RS-232C serial interfaces, there are ports for an ac power adapter, TV or monitor, dictation microphone, external speaker and two phone jacks, in addition to base units offering disk drives, Z80 or 8088 processors or printer/plotters.

There's even a side door for 48KB ROM packs with Xerox promising plug-in spreadsheet, graphics or filing programs. A tutorial ROM pack accompanies the 1810's tutorial microcassette, demonstrating functions on screen while a taped voice explains; it's a good introduction to the unit's numerous capabilities, though I found the voice and screen becoming unsynchronized as I was slow in finding and pushing buttons.

### Wanted: Wide Laps And Keen Eyes

The 1810 weighs five pounds. That's one more than the Model 100. On the one hand, it's not as uncomfortably heavy in your lap as eight- or ten-pound machines in the Gavilan or Sharp range are. On the other hand, the Xerox feels more like a board than

*Yes, the new Xerox portable does have a few innovative features that might be music to your ears, but the 1810's overall performance is off-key.*

a notebook—it measures two by nine by 16 inches, 4½ inches longer than the 100. The keyboards are about the same size; the Xerox's extra span accommodates the cassette recorder.

Speaking of the keyboard, it's first-rate: nicely contoured and angled keys, a shift lock key that lights up and a control key to the left of the space bar. (Besides serving software-related functions such as changing the word processor's backward deletion to forward, the control key works as a special shift, adding braces, brackets and other characters to the 1810's repertoire.) The feel for typing is excellent, something like a quieter or smoother IBM PC's.

It's what's above the keyboard that's disappointing. When you turn the 1810 on, the top line of the liquid crystal display shows the current date and time. The second line says "Xerox 1800 Portable Computer," and the third displays the menu options available from the ten function keys—Basic, Calc, Calndr, Link, Phone, Rompak, Setup, Tape, Text and Main (the tenth function key always returns you to this main menu).

The fourth...well, there is no fourth. The Xerox has a three-line, 80-column screen, and having only three lines—only two, as the last line labels the function keys' various uses, in every application but Basic—makes working with the 1810 a matter of peering at life through a mailbox slot.

Take Basic, for instance. The Xerox's Microsoft ROM Basic addresses only 32KB of memory, so you can't write any programs longer than 31,399 bytes; but would you want to write programs that you can't see? Write an elementary for...next loop to print your name on the screen five times and run your program—you'll see the last (fifth) repetition of your name, the cursor, and "OK" on the three LCD lines.

Should you write longer programs, good luck trying to list them. The 1810 doesn't accept LIST 20–30, seeing it simply as LIST 20- and flashing everything after line 20 before your eyes; Control-S will stop a scroll, but hitting it at the right time to see a particular line, as programs whiz past the narrow window faster than the eye can follow, is practically impossible.

### Complex Controls

The skinny screen is less of a handicap in other applications (an entry in an appointment book needs only one line and talking into a tape recorder needs none), but the Xerox is inconvenient in other ways. The Tape option, for instance, activates the 1810's microcassette, turning the function keys into Play, Record, Rewind, Fast Forward, Volume, Pause and Stop buttons.

The recorder serves two uses. First, it's the 1810's mass storage for calendar entries or text files, fitting 200KB of data on a 30-minute (voice) microcassette. It's fussy about separate tapes for voice and data, and it's not fast—I saved a 114-word file in 40 seconds and loaded it in 30 seconds—but it's serviceable, lighter than disk drives and cheaper than bubble memory cartridges.

Second, of course, the recorder makes a handy tool for dictation with the built-in (or a separate) microphone—but there's no autostop function to halt recording or rewinding when the tape reaches the end. Pocket tape recorders with autostop are available at K Mart; it's a shame to see the feature missing here.

Similarly clumsy controls plague the other built-in programs (except for Rompak and Link, used for ROM pack and expansion unit control and not tested here). The Setup option gives a wide range of choices—configuring RS-232C settings (bit rate, parity and so on) or pulse or tone phone dialing, setting the time and date or turning output devices like the printer interface on or off.

It also lets you adjust the contrast of the LCD display for viewing from different angles. From the main menu, you press Setup, then LCD, then the up and down arrow keys to adjust the display, then Exit (to the Setup menu), then Exit again (to the main menu). The Model 100 lets you do the same thing by turning a dial.

### Jack of All Trades, Master of None?

If the choice "Calc" on the main menu gave you fleeting thoughts of spreadsheet analysis, think again: It turns the Xerox into a four-function calculator, offering four memories and a running total, all of which can be cleared, as can mistaken entries. It's useful for adding up a series of numbers, but it'd be more useful if the 1810 were more like a calculator. There's no keypad, not even an imitation one like the Model 100's, and the plus sign is still shift-equal, not a single key to easily tap between entries.

There's also Calndr, which, like the Model 100's Schedl, creates a file of one-line entries read by a search function shared with the word processor. Besides the date and a description, you have to enter starting and ending times for each item (pressing return enters the current time). You have the option of setting a beep alarm that's useful for specific appointments, if less so for birthdays or anniversaries.

Unlike the Model 100, which opens each file at its top line, the 1810 opens its calendar at whatever entry you

viewed last; after you've selected the Find function and typed the desired string or item, it's your guess whether to press the up or down arrow to search above or below the cursor for it.

Still, Calndr is more accommodating than the phone directory that works with the speakerphone's autodialer. You enter a three-letter code (like ABC or MOM), in addition to each name and number, and must remember and search for that code instead of a name.

### Long Distance, Short Duration

The Phone function is the 1810's most innovative feature and the most fun to play with. Besides entering, removing and finding directory entries, it lets you dial a number (either in the directory or from the keyboard) and use the Xerox as a speakerphone, complete with a mute key to make sounds on your end of the line inaudible to the other.

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If the computer attached to your phone line rings while you're using another function, you'll have to exit to the main menu, select Phone and press Answer. On the other hand, once a conversation's started, you can leave Phone to calculate or take notes. When, back in the Phone menu, you hang up, the Xerox tells you how long the phone was off the hook.

Compared to a real phone, the 1810 is awkward to use; for example, you have to select Phone and hit the sixth function key to hang up. Still, the speakerphone is the machine's main attraction—almost its only attraction, considering the narrow screen and another disaster I'll mention in a minute. It's a safe bet that combined computers and phones will appear on more and more executives' desks; the Model 100 can be used as a phone dialer, but the Xerox is ahead of its competition in this regard.

This advantage—of being closer to the productivity tools of tomorrow—makes the Xerox less of a portable computer today. You don't take speakerphones on airplanes; you use hotel phones on trips; and the 1810, besides wanting a broad lap, is a bad traveler.

It has no batteries to replace, but a built-in nicad cell that gives only one hour's operation; to recharge the cell, you must plug the Xerox into its hefty ac adapter, which looks big enough to jump start a car. An hour might suffice to dash off a note on a plane trip, but the adapter/charger will double the Xerox's weight in your luggage.

### Last and Worst

Besides small things like awkward controls, brief battery life and no autostop on the tape recorder, there are two major problems with the 1810. One is the small screen, which doesn't bother me that much. I don't do a lot of programming and when I do, it's on a desktop, so I could live without listing programs. The other, which I haven't mentioned, makes the Xerox unusable for the task portable micros are used for most. The word processor is an abomination.

Not that the program's bad. Sure, you have to search with the up or down arrow for the exact string (upper- and lowercase or whatever), and you can't move quickly to the left or right margin or top or bottom of a file, and you only see two lines on the screen at a time. But for typing in a short note or a memo, it's okay.

What's unbearable is the 1810's slow response. The same 10KB of memory is shared by Text, Calndr and the phone directory; the more material you have in it, the slower the Xerox accepts input. The fine keyboard encourages fast typing, but the buffer can't stand it—when I tried a 15-line speed test, the 1810 went from dropping every fifth or sixth character to missing nine out of ten (see Example 1). After the first 100 words, even hunt-and-peck typists are far faster than the Xerox.

### Son of Star?

To sum up, the Xerox is eccentric—an appealing combination of micro, speakerphone and voice and data recorder, coupled with clumsy operation, a skimpy screen and typing response that makes an excellent keyboard less useful than a T/S 1000's. Something like it deserves a place on your desk, but the $2200 Xerox—more than twice the price of a Model 100—deserves attention only as a prototype.

After all, the Xerox Star, itself a flop, led to Lisa and Macintosh. The 1810 may do the same thing for intelligent telephones.■

1. The quick brown fox jumped over the lazy dog.
2. The quick brown fox jumped over the lazy dog. . . .
7. The quick brown fox jumped over the azy dg.
8. The quick brow umped overtelzy o.
9. The quick bon umpe ve h az do.
10. The quickbonfme oe h zy o.
11. Theqikbonfx u ve h zy o.
12. heqikrw o ume t lz o.
13. Th ukbw o umertelz o.
14. The ukbwfxumd hlz
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Example 1. Results of 15-line speed test.

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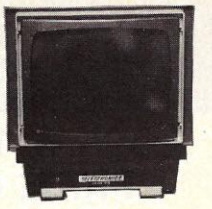
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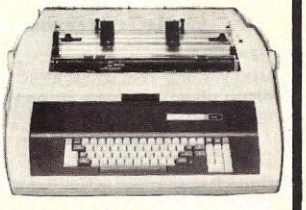


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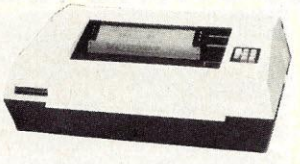
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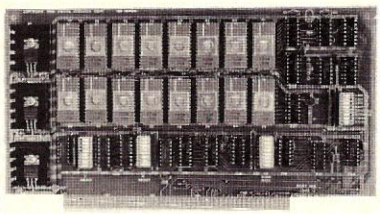
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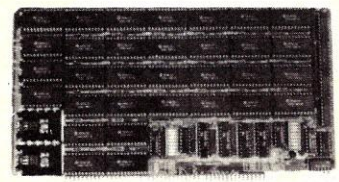
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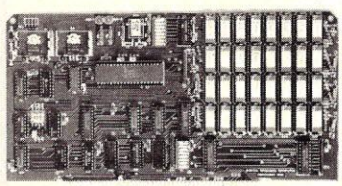


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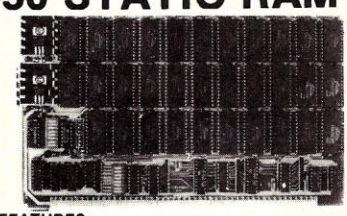
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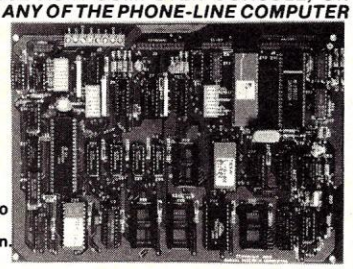
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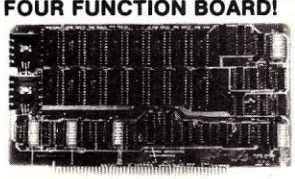
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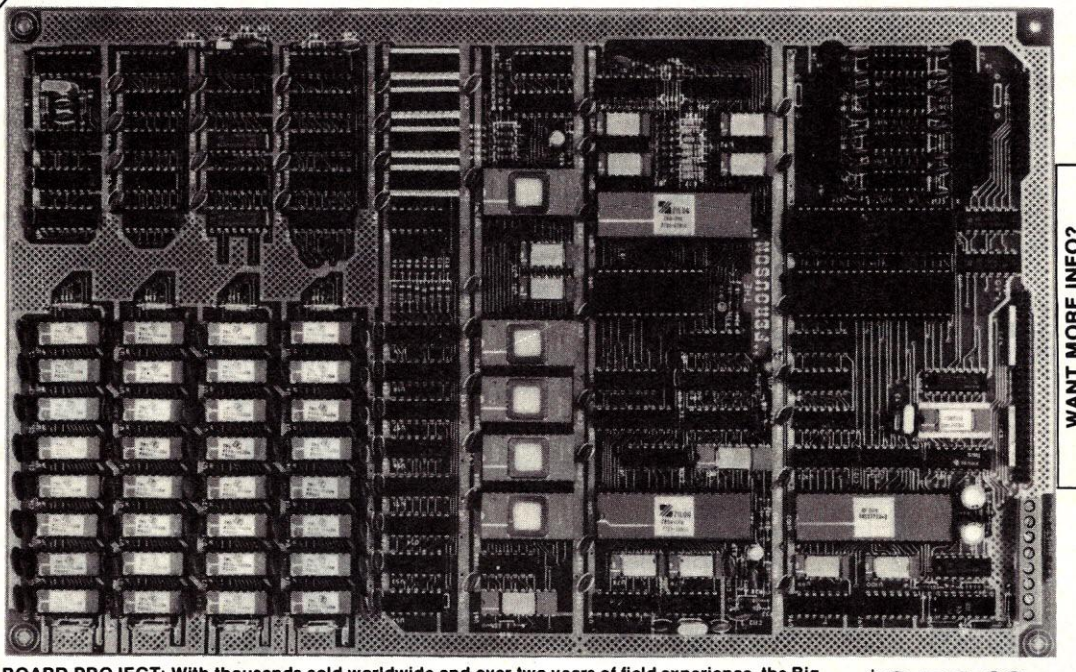
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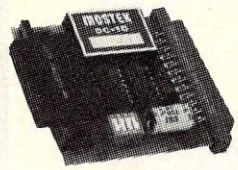
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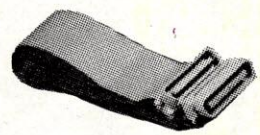
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# SOFTWARE REVIEWS

## Financial Planning—1-2-3 and the PC

**System Requirements:** IBM PC or a PC-compatible system; Lotus 1-2-3; 128KB, two disk drives.
**Manufacturer:** Howard Sams & Co., Inc., 4300 W. 62nd St., Indianapolis, IN 46268.
**Price:** $89.95.

The full title of this software package is "Financial Planning for Lotus 1-2-3 and the IBM PC." The package was developed by Expert Systems, Inc. Not only is the title impressive, but the documentation is enclosed in the now common IBM-sized loose-leaf notebook with an impressive looking suede-like beige cover. The package also includes a quick reference guide.

As you may surmise from the title, this software package comprises a spreadsheet overlay with the commands written in the Lotus macro language. Although the minimum requirements for the software are stated as 128KB RAM and two double-sided disk drives, it appears that if Lotus is first loaded and then directed to access the same drive for the overlay programs, you can get by with a single double-sided drive. This is especially true if your system has sufficient memory to simulate an electronic disk drive. Since I have a hard disk drive, I merely loaded the software in the area on the disk where Lotus 1-2-3 is contained and proceeded with the documentation.

### Reassurance

The instructions are detailed and clear. The quality and style are similar to much more expensive packages like Multiplan and the Lotus software itself. The documentation messages reassure beginners that they haven't done something wrong. The specific problem examples are divided into two columns with Action On Keyboard on the left and Result or Response On Screen on the right. One such message reads, "Command area flickers, worksheet goes blank, disk drive light goes on and drive makes clicking noises." If all of the above happens without warning, a beginner might get very nervous.

The program contains overlays in the areas of compound growth, annuities, discounted cash flows, profit planning tools, statistics and real estate finance.

The compound growth overlays include continuous compound interest and a good explanation of why businesses use it and how it compares with normal compound interest. This is much more complete than any other computer-related program documentation that I have seen for compound interest.

The overlays for annuities and discounted cash flow are more or less standard in providing worksheets for ordinary annuity, annuity due, continuous annuity, an amortization schedule, net present value, internal rate of return and a financial rate of return.

The profit planning area includes a break-even analysis worksheet along with depreciation and accelerated cost recovery system worksheets; statistics capabilities include mean, standard deviation, variance and linear regression worksheets.

Finally, the real estate finance area includes a wraparound mortgage worksheet as well as a single discounted cash flow worksheet that can be used to obtain data relative to variable rate mortgages, renegotiable mortgages, graduated payment mortgages, graduated payment adjustable mortgages, interest-only term loans with or without balloon payments and less-than-interest-only loans.

These programs not only provide you with the ability to view and print your results to a printer but also include the capability of providing graphs for some of your results, such as amortization schedules, profit planning and linear regression worksheets. If you have a graphics printer, your graphs can be printed out. I don't have a color printer, but presumably the color in the graphs as viewed on the screen can be passed to a printer.

### Spartan Text

After reading through the documentation and working the sample problems, it appears to me that the section comprising the first four areas of the program was written by one person, and the two sections on statistics and real estate were written by someone else. The writing style presentations are different in the two sections. It also appears that the person writing the first section got tired of providing interesting information relative to the worksheets and the formulas used in creating the worksheets. It was very noticeable that there were progressively fewer useful example problems as I read through the first section. I must admit, however, that most texts on the subject that I have seen in the past also have a paucity of information in the same areas as in this documentation.

The second section on real estate and statistics gives a reasonably clear explanation of the function of each worksheet, a slightly better walk-through explanation of one example problem and a few example problems.

Overall, I was quite impressed with this package for the list price of $89.95. The mistakes were so few that I developed a phobia for finding them. I did find several items that were slightly less than perfectly explained, and a very few mistakes such as a "1" where it was obvious that there should be "100" and a "$" sign typographical error. However, I did not find any serious errors. I do, however,

This package is the best in the area of mathematical computations.

believe that the failure to provide a section giving the answers to the example problems (so you can check your answers) is a serious omission.

**Repeat Performance**

A good set of documentation material should have plenty of repetition. However, the wording was for the most part identical and I tended to skip over the material even though, as I found out on a later review, there is an occasional new piece of information or warning buried deep in the paragraphs.

The so-called "quick reference guide" was merely a bound repeat of 96 pages of the loose-leaf material and appeared to me to be superfluous filler material to visually enhance buyer interest.

Chapter 2 in the loose-leaf notebook discusses using supplied worksheets as a basis for creating your own customized worksheets to solve the purchasers' specific problems. Since there is no discussion of how Lotus macros are used to operate the worksheets and there is no adequate discussion on how the formulas involved are converted to spreadsheet format, it seems that very few purchasers would ever take the time to write their own worksheets based on the purchased ones. However, the program does include an exit command on the worksheet so that you can roam through the spreadsheet at any point and customize worksheets at will.

In spite of a few reservations, I believe that this package is better than any others I have seen for this area of mathematical computations. If you need the functions mentioned above or if you merely want to figure out how Lotus 1-2-3 macro programs can be usefully written, this is a good product and worth the price.

**Bruce Lutz**
**Richardson, TX**

## Turbo Pascal

**System Requirements:** IBM PC or PC-compatible system; 128KB.
**Manufacturer:** Borland International, Inc., 4807 Scotts Valley Drive, Scotts Valley, CA 95066.
**Price:** $49.95 plus $5 shipping charge.

As we all know, Pascal is a high-level programming language originated by Professor Niklaus Wirth of the Technical University of Zurich, Switzerland. It was named in honor of Blaise Pascal, a famous 17th century French philosopher and mathematician.

Pascal is designed to aid in teaching a systematic approach to computer programming and is based on the concept of "structured programming." It is a language without line numbers that has some similarities to the Basic language that is familiar to most of us. Available as a compiler, Pascal converts the source code of your program files into machine specific, machine language object code for fast and efficient programming. Though Pascal is a general purpose language, it's used mainly for business and technical programming applications. Pascal is available for almost all types of computers: mainframes to micros.

**And Now, Turbo**

The advertisement reads: "Enter . . . The Future . . . TURBO PASCAL introductory offer, $49.95." I was caught, probably like many other interested computer hobbyists who have heard about Pascal. Coincidentally, I noticed the advertisement just as I was getting interested in using Pascal on my IBM PC.

It interested me, all right, especially the price. As a beginner, I didn't want to spend too much on a language that I wasn't sure I would use. At any rate, I was

I was caught, probably like many other hobbyists who have heard of Pascal.

hooked. A compiler that inexpensive? I *was* looking for a compiler, but I was skeptical because it looked too good to be true. Before ordering, I called to talk to someone in the company about its product.

After dialing its toll-free number, only to find that it was just an order-answering service, I asked for the company number and got through to a very knowledgeable individual who dispelled some fears I had about buying a product through the mail with no information except a well-designed advertisement.

He told me, in essence, that I couldn't go wrong buying Turbo Pascal because it's such a bargain and because it has several attractive features that aren't even spelled out in the advertisement. He also detailed some things that were just glossed over. He convinced me that Turbo Pascal is a professionally written program, and I wouldn't be making a mistake if I bought it. I decided to learn more about Turbo and forget about the other compilers I had been researching.

**Beginnings**

As a Pascal beginner, I just wanted to learn about the language before buying a compiler. I bought a book called *Elementary Pascal*, by Henry Legard and Andrew Singer. I must say that this book is the right choice for Pascal beginners because it takes you slowly through the basics of the language in a unique manner—the authors use a fictional story setting. Sherlock Holmes and his assistant Dr. Watson take you through several newly written Sherlock Holmes detective stories to solve puzzles using Sherlock's newly discovered tool, Charles Babbage's analytical engine, and,

I think a $49.95 investment is small for a complete Pascal system . . . I must recommend it.

of course, programming it in Pascal.

About 20 pages into the book, I realized that I wouldn't get much out of it unless I had a Pascal compiler to run the sample programs. Otherwise, I'd never get a feel for the language. Turbo Pascal was the perfect solution to my dilemma, since I didn't want to spend hundreds of dollars for a language I wasn't quite sure I could use. But since Turbo costs only $49.95, how could I go wrong?

I think a $49.95 investment is small for a complete Pascal compiler; before I go any further, I must recommend it. It has many unique features that may not be found on compilers costing hundreds more. It is also memory-efficient, requiring only 27KB to run with the editor. The program is supplied for the IBM PC on an MS DOS or PC DOS single-sided format disk and includes a 254-page book of instructions.

The biggest problem in learning a new language like Pascal is that you are at a disadvantage in terms of knowing what features to look for in a compiler. You are really at the mercy of the manufacturer if you want information on a product. It's hard to know what you should or should not look for.

A friend who had purchased Pascal from IBM told me that its Pascal doesn't allow you to clear the screen. This seems unusual, since all Basics (which I'm most familiar with) have some form of CLS or Home command, but IBM Pascal doesn't. I took his word, not having seen IBM Pascal in operation.

Upon receiving Turbo, I immediately looked in the index for a clear screen command. And sure enough, I found it: ClrScr. It cleared the screen and placed the cursor in the upper left corner. In fact, I found that Turbo Pascal has many features not found in standard Pascal, though any standard Pascal program will run in Turbo with no problem.

### Manual Details

The manual supplied with the Pascal is a slight disappointment. But don't let this discourage you from purchasing the program. You can't really expect an extensive tutorial to be included with a $49.95 program—and it isn't. But with the money you save by not buying the $300 to $600 name-brand compiler, you can go out and buy all the books available on Pascal and still have money left over.

You do get an interesting sample program with your compiler. It's an electronic spreadsheet, VisiCalc-type sample program example called by the filename CALC.PAS. There's a source code listing that must be loaded into the editor and then compiled to run. The program is really long: 1256 lines of source code. But it's fully commented so that you can read through the listing and see how an electronic spreadsheet is programmed in Pascal.

### A Test Run

After compiling and running the electronic spreadsheet example, I decided to test out one of the program examples from the book *Elementary Pascal* to see if the compiler will compile and run a program written in standard Pascal. I typed in a short program called Tides that reads in the day of the month and the hour at high tide, reads the day and hour of some earlier event and then computes the number of tide cycles during the elapsed time. Needless to say, while typing the program into the editor and compiling it, I made several typos, which I quickly corrected. On my second try at compiling, the program successfully compiled and ran.

The manual supplied with Turbo Pascal is a slight disappointment. But don't let this discourage you.

### Using Turbo

Before you can run Turbo Pascal, you must load your DOS. After you've done this, remove the disk and replace it with the Turbo Pascal program disk. To run the program, type "turbo"—the program will load and display the copyright notice and the following messages:

```
Default display mode
Include error messages (Y/N)?
```

If you answer Y, text will be displayed to explain the errors encountered. After answering the start-up question, a menu will be displayed:

```
Logged drive: A
Work file:
Main file:
Edit     Compile Run  Save
eXecute  Dir     Quit compiler Options
Text:      0 bytes
Free:  62932 bytes
>
```

Enter the highlighted command letter for the desired action. Enter an L to change the working drive from A to B or C. Enter a W to select the work file, which is the file you use to edit, compile, run, save or execute. Enter an M to select the main file, which may be different than the work file. Enter an E to edit the current work file. If no file is present, it will request the work filename. Enter a C to compile the work file or main file; if no main file is present, the program will compile the work file. Enter a D to display the disk directory.

Enter an R to run a program residing in memory. This will compile your program, display line numbers as they are compiled

and run it when the compiling is done (assuming there are no errors, of course). Enter an S to save the work file to disk; if an old version of the file exists, it will be renamed as a back-up file with the extension copying programs from within Turbo Pascal. When you exit the programs you ran while in Turbo, you are returned to the Turbo prompt. Finally, enter Q when you want to quit Turbo Pascal.

### Compatible Editor

For $49.95, you probably get about $250 worth of features. The editor is perhaps the most unique feature. If you're familiar with WordStar, the Turbo editor will be easy for you to use. I know that there are many people who'll argue with me. I personally don't use WordStar because I feel that, though the features are there, I'd rather use a more user-friendly word processor; I don't like using the control key (Ctrl-C will move the cursor one page down) with a letter combination to operate a word processor, especially when function keys are available for that use. But I'm sure once you've memorized the WordStar format editor, it too will be easy to use.

Turbo Pascal uses a WordStar-style editor for creating program text, with some minor differences and a few enhancements. For example, to end an editing session in Turbo, you press Ctrl-T and Ctrl-D to return to the menu. So if you know how to use WordStar, you will have no problems adjusting to this editor.

### Nonstandard Features

A typical Pascal program consists of a program heading followed by a program block. The block consists of a declaration, where the objects (variables and constants) are defined, and a statement, which specifies actions to be executed in your program for the desired calculation or function.

In standard Pascal, program headings and declarations must be placed in a specific format as follows:

```
program Tides(Input,Output);
```

Program headings aren't required by Turbo Pascal. They may, however, be used to title programs and to list the type of program action (in the example above, the program is for keyboard input and display screen output). Declarations cannot occur more than once in standard Pascal, and they must appear in this order only:

1. Label declaration
2. Constant definition
3. Type definition
4. Variable declaration
5. Procedure and function declaration

In Turbo Pascal, declarations may occur any number of times in a program block and in any order.

Turbo Pascal has another feature that's unique to the Pascal language. It allows for direct access to CPU memory and data ports, using the Mem and MemW arrays, which may be compared to Basic's peek and poke statements. The predefined arrays Mem and MemW are used to access your system's memory. Also, the arrays Port and PortW are used to access the data input/output ports of your system. In contrast, standard Pascal lacks the statements for direct memory access.

Also, Turbo Pascal allows for the entry of machine code instructions directly into a program with the Inline statement; Standard Pascal doesn't.

### Other Deviations from Standard Pascal

1. Dynamic variables don't follow standard Pascal procedures, but they are compatible with other popular Pascal compilers, such as UCSD Pascal.
2. Standard procedures for Get and Put aren't implemented; Turbo Pascal uses Read and Write procedures to handle input/output.
3. Goto statements are allowed but may not leave the current program block.
4. The reserved word "packed" has no effect in Turbo Pascal but is still allowed. This is because packing occurs automatically.
5. The standard Page procedure is not implemented because the operating system does not define a form-feed character.
6. Procedures and functions cannot be passed as parameters.

### To Buy or Not to Buy

Turbo Pascal runs like programs costing up to ten times its price, except that it does not come with its own tutorial, written or software type, to help you learn the language. The manual doesn't teach you how to program in Pascal, but it does include all necessary information, such as program installation, use of the editor and use of the compiler. It also includes all required language definitions, procedures and functions for this particular version of Pascal. If you are familiar with standard Pascal, though, you should have no problems using Turbo.

Turbo is definitely a good buy as far as programming languages go for the IBM PC, and I do recommend its purchase. But if you're a newcomer to Pascal, make sure that you go out and buy a few books on Pascal programming to use as a supplemental text to the Turbo manual.

**Howard Berenbon**
**West Bloomfield, MI**

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## Solomon Series I and II

**System Requirements:** For CP/M-based systems.
**Manufacturer:** Computer Group, Inc., MainLine Industrial Park, Lee Blvd., Frazer, PA 19355.
**Price:** $2595 (Series I), $3495 (Series II).

The Solomon I and Solomon II software packages offered by Computech Group, Inc., Frazer, PA, are sophisticated, complete, general accounting programs for

Z80-based CP/M microcomputers. Solomon I provides complete general-accounting facilities for small- to medium-sized businesses. Solomon II contains the same accounting capability as Solomon I but also includes job-costing capability for service-oriented businesses.

The Solomon I and II software packages are complete accounting systems and not just accounting programs for microcomputers. The complete package price ($2595 for Solomon I and $3495 for Solomon II) puts this software beyond the scope of the $100–$500 range of microcomputer-based accounting programs.

The accounting software is complete and sufficiently detailed to meet the needs of accurate accounting procedures. The Solomon software should make your CPA happy because it provides an audit trail, involves paper records to back up all transactions and provides reports that summarize the various accounts and transactions. However, these accounting programs are too detailed for the very small business that essentially operates on a cash and personal transaction basis. They presuppose an organization with defined well-established accounting policies and practices.

**Major Offerings**

The two software packages offer all of the major accounting functions (except inventory) that a business with well-established accounting practices can use. This includes general ledger, accounts payable, accounts receivable, payroll and with Solomon II, job cost accounting.

The accounting packages can: perform payroll automatically (including the computation of state and federal taxes); prepare W-2s and IRS reports; print invoices, customer statements, accounts payable checks, trial balances, income statements, balance sheets, budget, comparative income statements, current cash position reports and trial balances; and reports on the costs of particular job, if Solomon II is in use.

The Solomon software can also produce mailing labels and lists. With the MDBS program (also sold by Computech), you can extract customer names and addresses from your accounting database so that customized "form" letters can be generated with a word processing program.

The accounting packages also allow you to enter journal transactions, vouchers and payments, accounts receivable, cash and credit transactions, accounts of customers, vendors and employees and other necessary financial records. Cash receipts, disbursements and other order-entry and voucher accounting capabilities provide you with the ability to deal with cash transactions as well as transactions that you've entered from the usual forms and records.

Petty cash and cash on hand accounts are maintained separately from other accounts, a desirable capability in a computerized accounting system. In addition, you can specify that payments be credited to accounts that haven't been vouchered; this allows exceptional transactions to be recorded properly. The voucher system will write checks automatically, including those programmed for payment several months in advance. The system will also apply the available discounts and post all data into the appropriate expense, asset and vendor accounts.

Accounts are aged automatically on the basis of customer invoice data rather than the less adequate aging-by-last-payment basis. The software allows you to select invoices for payment as cash availability conditions permit. Reports of the current cash position are also available. The accounting software handles credit memos separately from the cash records, so your cash position is not distorted.

This accounting system will keep your books in balance at all times by checking each entry as it is entered. At any time, a trial balance can be requested to check the condition of the books.

As a management aid, year-to-date and month-to-date data is available for all vendor and customer accounts, as well as for asset and liability accounts.

The accounting software allows you to close your accounts monthly, quarterly or annually. You can close the payroll accounts for the calendar year while the firm's books are closed on a fiscal year basis. Depreciation of your firm's assets can be computed automatically if desired.

A desirable feature is the provision for two depreciation schedules, one for assets acquired prior to January 1, 1981, and the other for assets acquired after that date. You can take first-year depreciation, as allowed by tax laws, without distorting the established depreciation practice of the business. There are separate reports available for profit determination and for tax reporting.

The software protects your accounting database by the incorporation of a password facility that allows you to protect various accounts from access by unauthorized persons. Additionally, a record of each time the database is accessed is maintained internally, assuring that the most recent copy is used.

The accounting functions are accessed through display screen menus, which are displayed on the user's terminal display screen. Preprinted forms from NEBS Computer Forms for checks and invoices are used, unless you have had the Solomon software customized by an authorized dealer for forms used specifically by your firm. The standard Solomon forms on which you must enter the data are nicely designed, and if not completely self-explanatory, they're at least comprehensible, once you're familiar with their use.

The display screen menus are fairly easy to follow and use. If you have a question or aren't sure what exactly to enter, it's easy enough to find the section

you're working on in the user's manual for the particular accounting function you're using. After gaining some experience using the accounting system, it shouldn't be necessary to have the manual before you while you use an accounting function.

There are 104 accounting functions that can be accessed, through 11 major display screen menus. Many of the forms require you to enter ten or 12 items of unique data. The accounting software assumes that most of the information to be entered is taken from printed or typed material or from other sources such as invoices, time cards and credit vouchers.

The user's manual suggests that paper records are useful with the programs. Data entry isn't complicated as the display screen menus provide the format in which the accounting software expects the data. The cursor moves smoothly from one menu item to the next item as soon as you press the enter or return key.

Error handling for data entry and manipulation is very good. A key on the user's terminal keyboard is chosen (usually the escape or return key) which, when pressed, always allows the user to exit back to the preceding display screen menu or to return to the main display screen menu.

The accounting software allows you to correct an error, such as a customer charge or an account erroneously credited, through a journal entry to adjust the account balances. As data is entered, range checking is done for dates, decimal places and for any options selected.

Most of the display screen menus require a total for the transaction to be entered. If the data entered doesn't agree with the total, the information won't be posted until corrections are made. This is a necessity as users will occasionally transpose numbers or enter other errors. If these errors went undetected, they could result in many hours spent searching for the transposition or other error and then correcting it. Other error protection appears to be good, but you're frequently reminded to back up the database.

Installation of the Solomon accounting software is somewhat complex and will require that someone familiar with hardware, terminals and CP/M operating systems install it. Computech suggests that the local authorized Solomon dealer install the accounting software on your firm's microcomputer system.

The Solomon software package requires a microcomputer system that has at least two floppy disk drives that can store 600KB of data each. However, a much more desirable data storage capability would be a 10MB hard disk drive and a floppy disk drive for loading the user's software and backing up the accounting database.

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The Solomon accounting packages were not exceptionally fast when running on a floppy disk system, but they do perform their intended functions.

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There are two steps in the installation and initialization of the Solomon accounting system software. The first involves loading the Solomon software onto the disk drives of your microcomputer and configuring it for the hardware and user terminal environment of your microcomputer system.

The second part requires that the present books be closed and the balances carried over to the Solomon database. You must also establish your system of accounts, defining each account to which transactions may be posted. You'll have to enter employee, customer and vendor data. Beginning balances must be set in the appropriate accounts before you can access any of the accounting functions.

Each version of Solomon comes with a user's manual. The user's manual is several hundred pages long and describes each accounting function performed by the accounting system in detail. Most pages contain a representation of the CRT display screen, while the accompanying text describes the entry of the data needed for that particular display screen.

The Solomon accounting packages performed as was promised. They were not exceptionally fast when running on a floppy disk-based system but are usable and do perform their intended accounting functions. They do run much faster and are more convenient to use (it's not necessary to change floppy disks) when installed on a system that has a hard disk drive.

I was unable to test all of the capabilities of the accounting system in order to verify that no bugs existed because too many data configurations are possible than could be tested in a reasonable amount of time. However, the software appeared to be highly reliable and gave a strong feeling that it would provide a very good accounting system for an organized small- or medium-sized business.

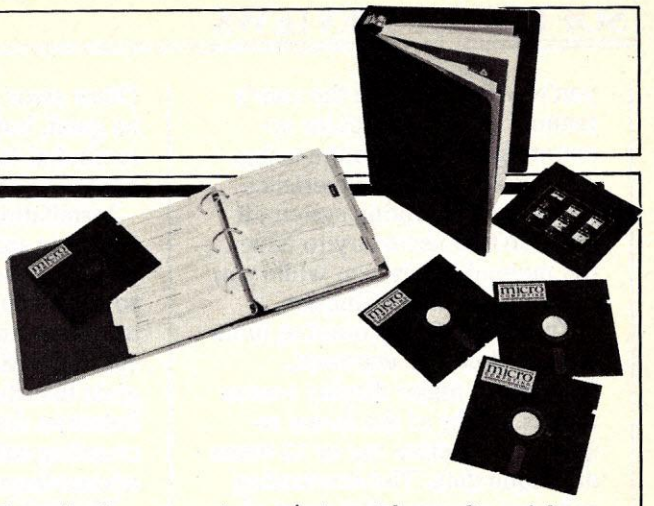
Companies that have installed newer 16-bit microcomputer-based systems for business use are not locked out of the Solomon accounting software, as Computech is offering a Solomon accounting system for these systems also. This software wasn't reviewed by the author; however, Computech has indicated that the 16-bit version of its software is as complete and reliable as that offered for the eight-bit microcomputers.

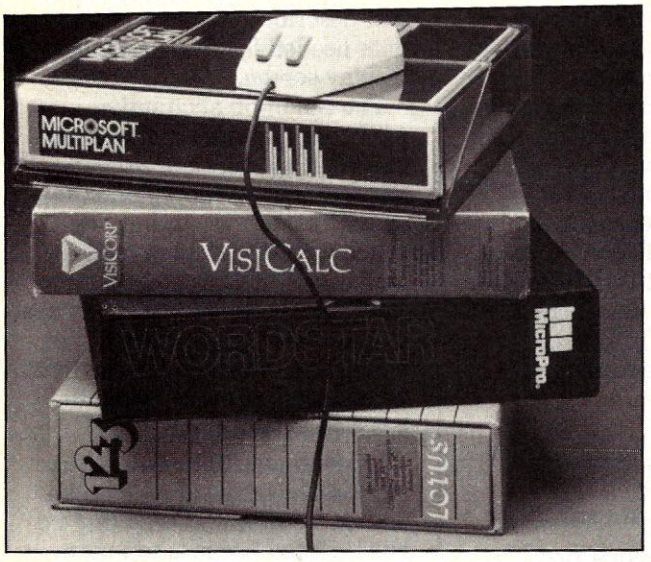
The Solomon accounting software package should satisfy the needs of small- and medium-sized businesses that require a detailed set of books and financial records.

**Don R. Walters**
**Ann Arbor, MI**

# NEW SOFTWARE

Edited by Amy Campbell






*Microsoft's Mouse Menu adds mouse-driven commands to these applications programs for $195.*

## Microsoft Wants a Mouse in Every House

The Microsoft Mouse Menu ($195) is a utility program that lets you add mouse functions to IBM PC application programs that normally have no mouse support. As part of the program, Microsoft has provided prewritten mouse menus for their Multiplan (MS DOS and IBM versions), Lotus 1-2-3, WordStar and VisiCalc.

Once installed, the software lets you initiate all commands by using the Microsoft Mouse—included in the package. Also included is a mouse programming language so you can write your own mouse support for other non-mouse-based programs. The source code listings are also available.

To use the mouse menus with applications programs, install the mouse driver software and run the mouse menu. To individualize the mouse menu for a specific application, type a menu filename such as "MPIBM" for Multiplan, or "123" for Lotus 1-2-3 and run the application.

Current owners of the Microsoft Mouse can receive an update for $25 by calling MicroSoft Customer Service, 10700 Northup Way, Bellevue, WA 98004, 206-828-8088. Reader Service number 461.

## Chart Runs with Popular IBM Programs

Microsoft Chart for the IBM PC, a business graphics program, lets you prepare presentation quality charts from data generated by popular software such as Microsoft Multiplan, Lotus 1-2-3, VisiCalc and dBase II.

Chart displays examples of different chart formats on the screen in a visual gallery. You select the format you want, and Chart automatically displays your data in graphics form. Variations on eight chart types provide you with 45 different forms.

You control the size, position and appearance of each object in the chart. Any object, title or legend can be moved around on the screen with the direction keys. Use up to 16 charts at once, or overlay them to produce complex charts. You can save Chart formats or overlay them on data, so you need only to define your favorite format once.

The program, compatible with MS DOS 1.1, 2.0 and 2.1, requires 128KB of RAM, one disk drive and an IBM color graphics card. Approximately 20 printers and ten color plotters are compatible.

Chart sells for $250 from Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004. Reader Service number 462.

## Spreadsheets on the Epson HX-20

A Spreadsheet for the Epson HX-20 is a program that allows you to create, modify and calculate (what else?) spreadsheets on an Epson lap computer.

The program displays a three-row by two-column window in the upper left of the LCD screen that shows entry and update operations. The top line of the screen shows the currently accessed row and column of the spreadsheet cell and that location's data.

Reference the desired row and column index of a cell to display it, or use the four arrow keys to scroll between cells. Each cell displays the left-most nine characters—scrolling reveals data longer than nine characters. The spreadsheet is 16 rows by 16 columns on a 16KB computer and 26 rows by 35 columns on a 32KB computer.

The spreadsheet program sells for $50 from Brian Lomasky, 984 Hanover Road, Meriden, CT 06450. Reader Service number 466.

## Dataease and Wordease: Integrate On IBM PC

Dataease ($600), a menu-driven, relational database management system, and Wordease ($300), a full-function word processor, are part of Softease, a family of integrated productivity programs for the IBM PC and other 16-bit microcomputers.

Software Solutions, makers of Dataease, claim the product to be more comprehensive than dBase II, yet easier to learn and use. Menus to help beginners are bypassed in the expert mode.

With it, you can obtain information from any number of files and derive data fields based on information in other fields. If you change data, it automatically

changes any contingent fields. The program can import files from dBase II and import, as well as export, data to spreadsheet, graphics and word processing programs.

A password lets you access the program's menu, files or reports. You can record up to 255 fields per record, 255 characters per field, 65,535 records per file and 8000 characters per record.

Wordease, the word processor component, formats documents on screen, lets you set up paragraphs in side-by-side columns and can protect copy from page breaks. If you change margins, it automatically reformats paragraphs, and if you accidentally delete information, you can restore it.

The screen image shows italics, boldface, underlining and variable character-per-line pitch. A Wordease-compatible spelling checker will soon be released by Software Solutions, Inc., 305 Bic Drive, Milford, CT 06460. Reader Service number 463.

## Program Your Apple for 3-D

Programming three-dimensional (3-D) graphics on your Apple computer doesn't have to involve hexadecimal math, pokes, byte-swapping or complicated subroutines. So says Artemis Systems, Inc. (41 Parkway Drive, Millburn, NJ 07041), developers of Metalogic, an interface to the powerful SubLogic graphics package using the traditional Basic "&" command.

Metalogic ($75) lets you program 3-D graphics quickly and easily. By embedding "&" statements within a regular Basic program, you can generate individual objects or complex animated scenes without all the forementioned fuss.

Artemis has retained all the functions in the SubLogic's package and has added several new functions to simplify display file and memory management. Reader Service number 472.

## Compiler/Interpreter/ Assembler for the Epson HX-20

tForth/HX-20 is a ROM-based language system for fast interactive code development for data collection, analysis, communications and computation on the Epson HX-20 Notebook Computer. Talbot Microsystems, manufacturer, claims the system's speed is ten to 15 times faster than Basic.

The system contains a full FIG-Forth Standard interpreter and compiler, a complete 6800/6801/6301 assembler and many extensions for HX-20 input/output devices. It comes on two CMOS 8KB EPROMS with reference manual, and you can install it in place of Basic in the HX-20 case (leaving 12KB of RAM) or in the HX-20 Expansion Unit (leaving 28KB RAM).

It provides detailed access to the HX-20's ROM system routines. There are families of words for control of the LCD screen graphics as well as alphanumerics, the internal printer, microcassette tape, communications port, function keys and sound generator. The assembler lets you produce code words for even greater speed.

tForth/HX-20 sells for $190 from Talbot Microsystems, 1927 Curtis Ave., Redondo Beach, CA 90278. Reader Service number 467.

## Newword for the PC and PCjr

Newword, a word processing/merge print package that is upward compatible with WordStar/ MailMerge, is now available for the IBM PC and PCjr.

Its features include support of seven screen attributes, dot matrix printer support (microjustification, variable line height, variable character width), 40 programmable keys, printer selection and delete-error recovery.

Newword can be put into ROM and full eight-bit character support is available. It sells for $249 with CP/M-86, and MS DOS/PC DOS versions with standard terminal menus are also available from Newstar Software, Inc., 1601 Oak Park Blvd., Pleasant Hill, CA 94523. Reader Service number 468.

## Multi-User Basic/Z Compiler

The newest version of Basic/Z, a native-code compiler for multi-user systems, promises to be totally compatible with numerous operating systems including CP/M, CP/M Plus, MP/M II, CP/M 86/80, Vector Extended CP/M and Turbo DOS.

Most important among the new features is file/record locking and support for multiple system printers. It supports cursor positioning, screen attributes, input masking and screen-oriented editing of console input at run-time. Added features include alphanumeric labels, BCD math to eliminate round-off errors, program-definable precision up to 18 digits, a built-in sort verb, recursive multiline user-defined functions and a program editor that tests syntax as you type.

Basic/Z sells for $345 per installation from System/Z, Inc., PO Box 11, Richton Park, IL 60471. Reader Service number 471.

## Create with Doodler and Heath/Zenith 100

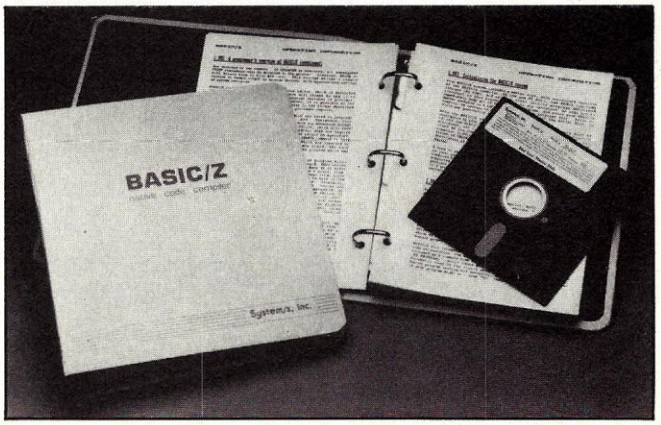
The Doodler Graphics Package ($79.95) turns your Heath/Zenith 100 computer into a sophisticated design tool. Menu-driven single-key commands aid in drawing and designing two-dimensional objects in color or monochrome.

Draw lines, boxes or circles. Move copy or erase portions of the screen; vary text width, space proportions and scale. Italic and backslant fonts are available and you can design your own character fonts using the font editor. You can save any design on disk or printout. Drivers are included for Gemini, Epson and C.Itoh dot matrix printers.

For more information, contact Paul F. Herman, Data Systems Consultant, PO Box 535, St. James City, FL 33956. Reader Service number 473.

## TK!Solver: Now for The Apple IIe

TK!Solver ($399), an equation-solving tool designed




*Basic/Z native code compiler is now available for multi-user systems at $345 per installation.*

for people who use equations, formulas and modeling for analysis, design, planning or problem solving, is now available in a format for the Apple IIe.

TK!Solver lets you solve for any variable in an equation without restating the problem. Other features include iterative solving, list solving, tables and graphs, automatic unit conversion and 34 built-in functions as well as user-definable functions.

Also available for the IIe is TK!SolverPack for Introductory Science ($100), a program used with TK!Solver and geared toward high school and college level chemistry, biology, physics and general science courses.

TK!Solver software is manufactured by Software Arts, 27 Mica Lane, Wellesley, MA 02181. Reader Service number 465.

## Symphony Software: Lotus' Perfect Harmony

According to Lotus Development Corp., its all-in-one software system, Symphony ($695), eliminates the need for stand-alone software packages. It combines word processing, database, spreadsheet and mail-merge capabilities with communications and business graphics in an integrated windowing package. The entire 320KB RAM program runs on a single disk drive and resides in memory.

Symphony's window management lets you view simultaneous screen displays of spreadsheets, documents, forms, graphs and terminal sessions. You create and alter windows to suit your needs.

The open-ended package accepts add-in programs that work as part of the Symphony system. It supports operating environments such as Microsoft Windows and Quarterdeck DesQ. Additional features include help screens and on-disk tutorials.

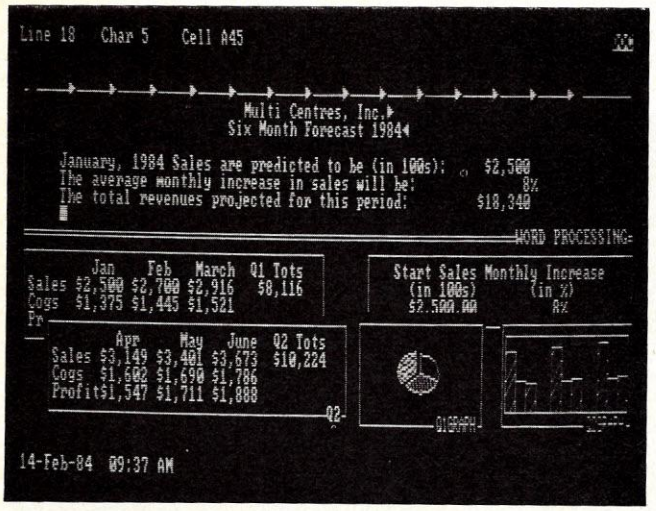
Registered owners of Lotus 1-2-3 can receive credit for the full price of that program toward the purchase of Symphony from Lotus Development Corp., 161 First St., Cambridge, MA 02142. Reader Service number 460.

## Apple Database Management System

Get four for the price of one. Softsmith Corp. offers 4 in 1, a database management system, at $129.95, that handles word processing, list and label making, calculations and data management for home or business.

The program ends the need to locate and change disks in mid-stream since all operations are in a single program. It can calculate within a defined field and then merge those fields and the results into forms or letters created with the word processor.

Menus, on-screen tabs and margins and explicit documentation make the package easy to use, according to Softsmith Corp., 1431 Doolittle Drive, San Leandro, CA 94577. Reader Service number 464.




*Here Symphony integrates through its window management system a word processing window, three spreadsheet windows and two graph windows on an IBM PC.*

## Redefine Your IBM PC Keyboard with SmartKey II

SmartKey II Plus is an enhanced version of SmartKey II, the keyboard redefinition utility that lets you assign a series of characters or commands to any key, thereby eliminating repetitive typing tasks.

SmartKey II Plus provides IBM PC or PC-compatible owners with a keyboard definition display at the bottom of the screen while you redefine a key. The display scrolls horizontally or vertically and can accommodate any number of characters.

Current owners of SmartKey II can upgrade to the new software on a trade-in plus $20 through Software Research Technologies (formerly Heritage Software), 3757 Wilshire Blvd., Suite 211, Los Angeles, CA 90010. Reader Service number 475.

## IBM PC Program Designer

Dezign-PC, a structured program designer, is geared for programmers of Ada, C, dBase II, Pascal and PL/1. It enables you to interactively construct data structure diagrams, program structure diagrams and executable operations, and it lets you generate structured source code from these.

A Dezign-PC database can contain up to 100 modules, each containing up to 30 data/program structure diagram pages and 200 executable operations. It runs under DOS 2.0 and requires 128KB of RAM and one drive. It sells for $100 from ZEDUCOMP, PO Box 68, Stirling, NJ 07980. Reader Service number 476.

## Good News For TRS-80 Programmers

Logical Systems, maker of LDOS 5.1 and TRS DOS 6.X for the TRS-80 Model 4, has released two Model 4 utilities for Basic programmers and has published the complete commented assembler source code for LS DOS/TRS DOS 6.2.X.

The publication LS DOS/TRS DOS 6.2.X "The Source" comes in three 8½ × 11-inch softbound volumes: Volume 1/The System, Volume 2/The Libraries and Volume 3/The Utilities. Each sells for $99 ($249 for the set).

The Model 4 utilities are BSORT, a sorting utility executed from Basic to sort an array, and MOD324, a Basic conversion aid. BSORT supports tag, index, string and numeric arrays, mid-string sorts, ascending and descending sorts and more. It requires TRS DOS 6.1.2 or 6.2.0.

MOD324, written in assembler, converts a Model III Basic program to a format usable on the Model 4. It can also adjust print locations on the screen and point out lines that need further modification.

Both utilities together cost $49 and are available from Logical Systems, Inc., 9870 North 55th St., Milwaukee, WI 53223. Reader Service number 470.

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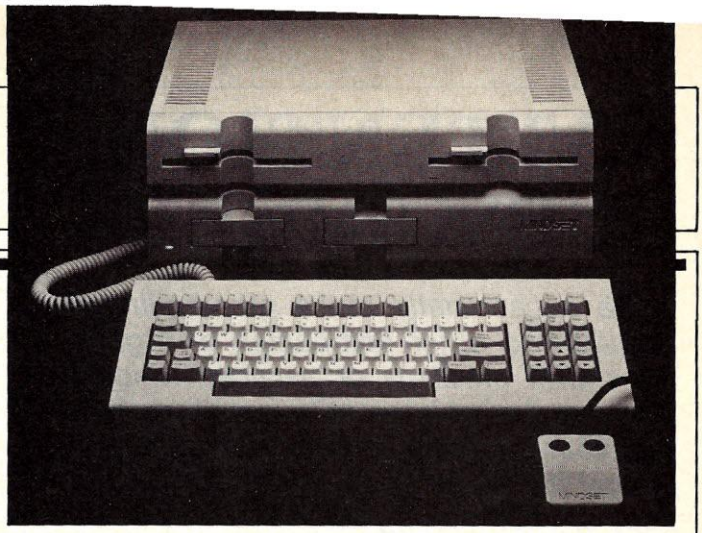
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# NEW PRODUCTS

Edited by Amy Campbell



*The 256KB Mindset Personal Computer combines an Intel 80186 chip and custom graphics coprocessors to outperform the IBM PC.*

## Mindset: PC Compatibility And a Step Beyond

The Mindset Personal Computer runs Lotus 1-2-3, WordStar, MultiPlan, MicroSoft Word and most software written for the IBM PC. But beyond simple compatibility, Mindset Corp. claims that the advanced color graphics machine enhances the performance of standard software, as much as ten to 100 times for graphic-intense applications, for example.

The MS DOS machine's architecture combines an Intel 80186 16-bit microprocessor with two Mindset-designed custom graphics coprocessors. It can support two 360KB disk drives and up to 256KB of RAM. Price for the system ranges from $1099 to $2398 for a fully configured 256KB, two-drive system.

The Mindset drives several types of video displays, including color RGB monitors, composite monitors and standard color televisions.

In addition to standard IBM-compatible software, Mindset has announced a base of advanced color graphics packages for the new machine. For more information, contact Mindset Corp., 617 N. Mary, Sunnyvale, CA 94086. Reader Service number 480.

## Sound Effects For the Apple II

With the DX-1 Sound Processing System ($239) and an Apple II you can record, process and play back ordinary (real) sound. While other systems generate and produce computer sound, DX-1 works with real sound entered directly by a microphone or other source.

The DX-1's on-board high-fidelity pre-amp circuit lets you reproduce and modify actual sounds with the DX-1 Effects program and 22 pre-recorded sounds on disk. The system requires a 48KB Apple II or IIe, DOS 3.3 and Applesoft Basic.

Also available to enhance the DX-1 Sound Processing System are DX-1 Echo ($149) and DX-1 Volumes 2–5 ($79). DX-1 Echo requires 36KB RAM and includes routines for real time audio processing, echoing and reverb. You can access over 40 routines and use a joystick to control various parameters, such as digitizing sample rate, echo loop length, and echo loop start and end locations. A direct connect feedback potentiometer is included.

DX-1 Effects Volumes 2–5 consists of four disks—each containing 18 to 24 pre-recorded sounds. You'll find sounds ranging from a piano or a hiccup to space-aged zaps and explosions.

The DX-1 sound system is available from Decillionix, PO Box 70985, Sunnyvale, CA 94086. Reader Service number 483.

## 68000 Coprocessor For Apple II

McMILL ($229), a 68000 coprocessor card for Apple II, II Plus and IIe computers, is being sold by Stellation Two (PO Box 2342, Santa Barbara, CA 93120) as an entry level educational board for those interested in working with the 68000 microprocessor.

Designed by ex-Apple engineer Ron Nicholsen, McMILL measures only six inches in length—the smallest 68000 card available, according to Stellation Two. The unit uses Motorola's 68000-compatible processor, the 60008. Source and/or object code developed for the 68000 runs on the 60008 and vice versa.

Included with McMILL are hardware documentation, schemata and FIG Forth software (under public domain from Mountain View Press). Optional software includes a 68000 cross assembler from SC Software that includes a trap monitor for debugging code, a line-oriented editor and complete documentation. The price for the coprocessor with software is $299. An enhanced screen editor is available as an option.

McMILL carries a one-year hardware warranty. Reader Service number 486.

## Model 4 Speed-up Board

Make your TRS-80 Model 4 do time-and-a-half with the Alpha SUPER4 speed-up board ($79.95) from Alpha Technology, Inc. You can install the board in minutes. There's no cutting, no soldering, no wires to connect. Just unplug one IC, insert that IC in the SUPER4 board and insert the board in the IC's socket.

Alpha Technology reports the board will run your Model 4 at 5.1 MHz, a 50 percent increase in speed. Otherwise, your machine operates normally. Model III software works in the fast mode, and the speed-up board lets you run double-density disks on an eight-inch drive.

The board is available from Alpha Technology Inc., PO Box 1908, Huntsville, AL 35807. Reader Service number 487.

## Penpad Teaches IBM Penmanship

Penpad 320 ($995), dubbed the mouse that writes, is an intelligent pen-and-tablet peripheral for the IBM PC that employs dynamic character recognition, letting you input data or graphics via penstrokes. Penpad also lets you add mouse functions (cursor motion control and command trigger) by moving the pen near the surface of the tablet and pushing the button on the pen to provide the trigger.

Penpad recognizes your handprinted capital letters A through Z, numerals zero through nine and 23 symbols as well as upper- and lowercase characters. An upside down U erases a character, or you can simply write over mistakes. The keyboard remains functional while using Penpad.

As a digitizer, Penpad can send freehand drawings and tracings to the computer or function as a touch pad (a less sophisticated digitizer that recognizes when a stylus contacts specific areas of its surface).

The touch pad capabilities of Penpad are significant when used in conjunction with a defined series of command characters (macros). You can create your own templates—assign functions to circles or grids and label them accordingly. To execute functions, you don't have to bother with remembering commands like <CTRL>Q; simply point to the English-labeled grid with the pen and push the button.

Penpad works unmodified with Multiplan, Lotus 1-2-3, VisiCalc and WordStar and is specially adapted to work with VersaForm. Utilities are available to help you adapt Penpad to off-the-shelf software.

Penpad's add-in board, containing its own MC-68000 microprocessor and programming, occupies one full-length function slot in the IBM PC or XT. The tablet measure 15⅞ × 16⅞ × ½ inches and offers an active writing area of 11 × 11 inches.

Penpad is manufactured by Pencept, Inc., 39 Green St., Waltham, MA 02154. Reader Service number 482.

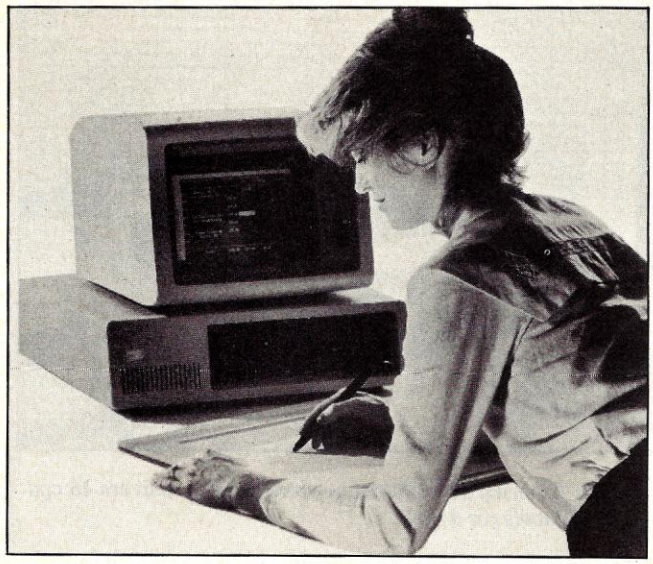
## Olympia Typewriter: Built-in Interface

The folks at Olympia USA think you should get double duty out of an office typewriter. The Electronic Compact 2 typewriter ($599), with built-in Centronics parallel interface for receive-only communications, acts as a low-cost daisy-wheel printer.

The unit features a 14 cps print speed, 46-key computer keyboard with LED indicators, three pitch selections (ten, 12 and 15 characters per inch), half spacing, forward and reverse indexing, a 46-character correction buffer with automatic relocate, electronic margin and table setting and a preprogrammed self-diagnostic test.

An optional interface extension module ($149) provides both parallel and RS-232C interfaces with a 2KB (approximately one page) memory buffer, a copy key to repeat printout of the 2KB buffer as needed and a clear memory key.

For more information, contact Olympia USA, PO Box 22, Somerville, NJ 08876. Reader Service number 489.



*For $995, Penpad for the IBM PC lets you write, draw and issue commands using an electronic ball-point pen and tablet.*

## PC DOS Phone Manager

The DIALOG series of real-time voice storage and retrieval products for the IBM PC is aimed at office automation applications. This includes voice annotation of text for word processing, voice mail, intelligent phone management (such as voice store and forward), remote messaging and data entry, computer-aided instruction and a variety of program interfaces.

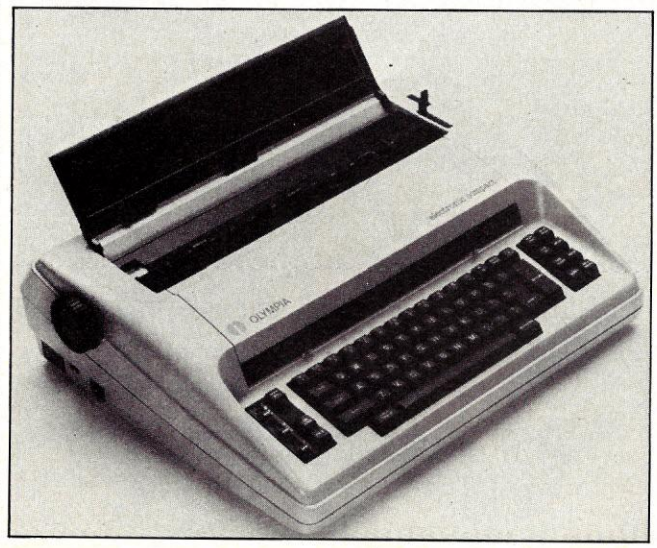
The DIALOG plug-in board takes voice input from a standard microphone, telephone or local network interface. It compresses voice input, stores it on disk and replays it under software control. The system provides unlimited vocabulary and tonal quality since it reproduces original voices with little distortion. You select a four, six or eight kHz sampling frequency.

The data storage rate for a normal spoken message requires less than 2KB per second for telephone quality messages.

There are three configurations available. DIALOG/1 ($295) provides the basic voice I/O capability. DIALOG/2 ($495) adds a phone interface, autodial and autoanswer firmware and tone decoding. DIALOG/3 ($595) includes a 300 bps modem and digital transmission firmware.

Each board comes with a set of software device drivers and a demonstration program to incorporate DIALOG into you applications programs. A programming interface is provided for Basic, Pascal, C and IBM assembler languages.

For information or to order write Dialogic Corp., 164 McKinley Ave., East Hanover, NJ 07936. Reader Service number 490.



*Olympia USA's electronic typewriter interfaces with most personal computers to become a 14 cps daisy-wheel printer.*

## Sord's Briefcase With Windows

The Consultant IS-11 ($995) is a briefcase-sized computer that offers multi-windowing capability. Its 32KB nonvolatile RAM is expandable to 64KB, while the standard ROM is 64KB.

Built-in program functions

include data handling, calculation, word processing, communications and help. The Consultant's bit-mapped LCD display can handle eight rows of 40 characters. Including a microcassette for data storage, the unit operates on ac or its internal rechargeable battery. Weighing in at 4 lbs. 6 oz., the portable measures approximately 12 × 8½ × 1½ inches.

Future options for the RS-232C interfacing machine include a thermal printer, numeric keypad with 16 additional function keys, a 3½-inch floppy disk drive, bar code reader and a Basic programming module.

The Consultant is a product of Sord Computer of America, Inc., 645 Fifth Ave., New York, NY 10022. Reader Service number 485.

## Owner to Apple: "Can We Talk?"

Forget about talking to the animals. . . what an achievement it would be if you could talk to your Apple II. IntroVoice II, a speech input device complete with plug-in board, desktop microphone and support software, lets you do just that. The manufacturer, Voice Machine Communications, Inc., claims IntroVoice II is 98 percent accurate for vocabularies of 160 words or more and is compatible with any existing Apple II series application software.

The package ($1120 for the Apple II and II Plus; $1195 for the Apple IIe) lets you input commands and data by voice or in combination with the keyboard.

Speech recognizers with syntax let you define a word to have multiple meanings to the microcomputer.

IntroVoice II lets you control foreground/background programs as well as make corrections, repeat commands and turn the machine on and off by voice control.



*Fujitsu America's SP320 daisy-wheel printer delivers 48 cps at 57 decibels for $1499.*

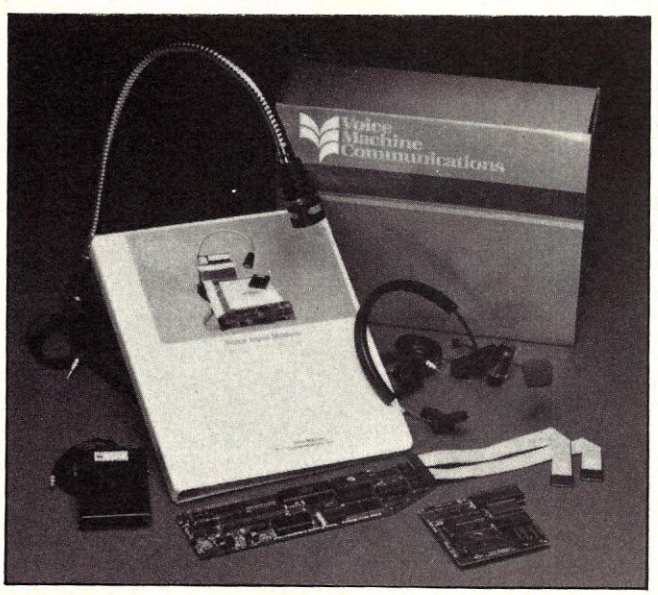
The board contains a 16-channel audio spectrum analyzer, 16KB of RAM and 8KB of ROM. The unit comes complete with all components for immediate use from Voice Machine Communications, Inc., 1000 S. Grand Ave., Santa Ana, CA 92705. Reader Service number 484.

## Where Will You Be If the Lights Go Out?

Besides being in the dark, you'll be in a lot of trouble if a power failure strikes while you're working on your microcomputer. That's why Para Systems has introduced Minuteman ($435), a standby power supply and voltage regulator that protects your microcomputer, disk drives and word processors. It is rated at 250 watts and provides back-up power in five milliseconds.

When a power interruption or outage occurs, the Minuteman immediately switches from ac power to its own emergency battery power for up to 15 minutes, giving you time to save data and wrap up processing. When power returns, the unit automatically switches back to ac. The self-contained battery recharges automatically.

For more information, contact Para Systems, 11425 Mathis St., Suite 404, Dallas, TX 75234. Reader Service number 492.




*The IntroVoice plug-in board lets you interact with the Apple II applications using voice commands.*

## Daisy-Wheel Printer From Fujitsu

Fujitsu America, Inc. promotes its SP320 daisy-wheel bidirectional printer as "medium speed" at 48 cps. The printer measures 6.3 inches high by 21.7 inches wide by 15 inches deep. It operates at 57 decibels and can use a variety of character fonts in both 96 and 127 character printwheels.

The printer offers line spacing of 1/48 inch and column spacing at 1/120 inch, facilitating use of subscripts, superscripts, curves and other graphics. Horizontal and vertical tabulation features give the SP320 fast and flexible printing capabilities on a 136-column print width.

High-resolution stepping motors drive the printwheel, paper and carriage drive mechanisms. Fujitsu assures reliability at 4000 hours mean time between failures. An integrated self-diagnostic function is included to reduce maintenance time. The unit comes with a Centronics, RS-232C or dc current loop interface.

The printer sells for $1499 from Fujitsu America, Inc., 3055 Orchard Drive, San Jose, CA 95134. Reader Service number 488.

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BOOKS

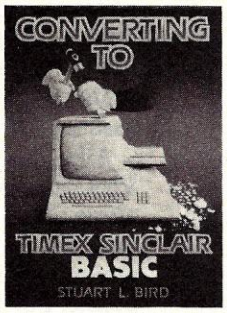
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BOOKS



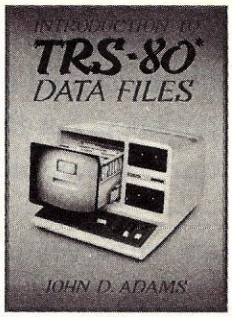
### Rainbow Quest for the Color Computer

*A computer fantasy for young Color Computer users.* Rainbow Quest *is an adventure that combines fiction and programs. Readers must cross the planet Rainbow and master a series of challenges to succeed on the Quest. Each challenge is a program on cassette. Included are arcade games, puzzles, and mazes. Book and cassette sold together.* **$24.97 BK7391 128 pp.**




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*Convert programs to run on your T/S 1000 or 1500. This is a guide to translating from other BASICs into Sinclair BASIC. Fifteen types of instructions are covered. The T/S replacement is given for each, followed by a description of its use and an example. Much of the material applies to the T/S 2068.* **$14.95 BK7396 206 pp.**



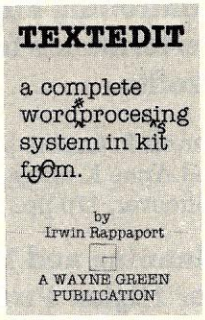

### Introduction to TRS-80 Data Files

*Learn by doing with this guide to writing a data base manager. This book, with its accompanying software, takes you through a simple, mailing list program to teach you about sequential and then random access files. The construction of a DBM and the techniques for moving data to and from disks are discussed.* **Book and TRS-80 disk** *$24.97 BK7398 approx. 144 pp.*



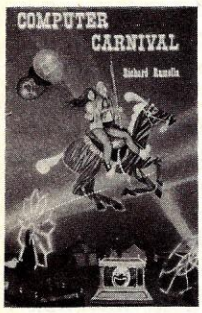

### Inside Your Computer

*Find out what goes on inside your machine.* Inside Your Computer *explains microcomputer circuits and how they work. Topics include chips, interpreters, circuits, machine language, binary numbers, algorithms, ASCII code, software, and what they all mean to the computer. Includes many photographs and schematics.* **$12.97 BK7390 108 pp.**



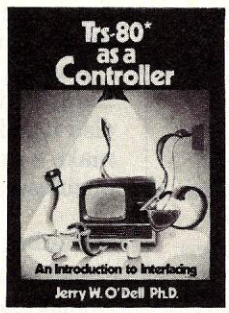

### TEXTEDIT

*Build your own word processor with the TEXTEDIT kit. This TRS-80 Disk BASIC system is built in modules, so you can modify them or use only the parts you need. Features include complete editing, search, replace, and count, and upper/lowercase typing on an unmodified Model I. Model III users need the TRSDOS CONVERT utility to use the disk. TEXTEDIT is compatible with any major DOS. It operates with one drive; two drives or copy utility needed to transfer programs to system disk.* **Book and disk package $24.97 CC7387**



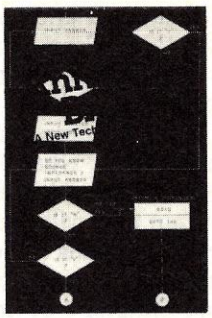

### Computer Carnival

*For the TRS-80 Models I and III. These sixty programs for beginners will entertain and educate. Children will find mazes, word games, graphics, puzzles, and quizzes. Card games, logic tests, word and number quizzes, and letter guesses make* Computer Carnival *a learning experience. The* Carnival Companion *cassette of all sixty programs is also available.* **Computer Carnival and Carnival Companion** *$24.97 CC7389* **Computer Carnival** *$16.97 BK7389 218 pp.* **Carnival Companion** *$9.97 TP7389*



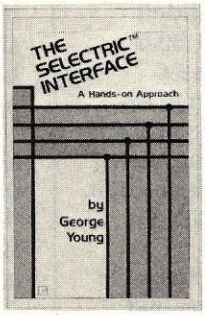

### TRS-80 as a Controller

*Learn to control outside devices with a TRS-80. This book is an introduction to interfacing, with simple, inexpensive projects. Applications include controlling lights and switches, building a small computer, and suggestions for more complex applications. The book applies to the Model III and, with minor conversions, the Model I.* **$12.97 BK7394 192 pp.**



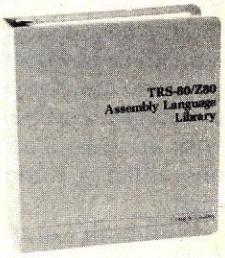
### Annotated BASIC, vols. 1 and 2

*This two-volume set teaches you the hows and whys of BASIC programming. TRS-80 Level II programs are taken apart and described in detail. Each program is accompanied by documentation, program annotation, BASIC concepts and definitions, and a flowchart.*
**Vol. 1** *$10.95 BK7384 160 pp.*
**Vol. 2** *$10.95 BK7385 125 pp.*




### The Selectric™ Interface

*You can turn an IBM Selectric I/O writer into a letter-quality printer for your computer.* The Selectric Interface *gives you the programs and step-by-step instructions you need for Selectric models 2740, 2980, and Dura 1041. With slight modifications, the instructions will work for various chips.* **$12.97 BK7388 124 pp.**




### TRS-80/Z80 Assembly Language Library

*Learn to use assembly language on the Model I to its full capacity. Two TRSDOS-compatible disks are included, with programs worth many times the book's cost. You'll learn about TRS-80 hardware and software, general Z80 routines, and TRS-80 utility programs. Examples show you how to apply the information to your everyday programming. Model III conversions are given.* **$34.97 BK7395 355 pp. Disks included.**

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### Kilobaud Klassroom

*Learn electronics with this hands-on course. This collection of electronics projects starts with simple concepts and takes you on to building your own small computer. You'll learn electronics theory and get the practice you need to master digital electronics.* **$14.95 BK7386 393 pp.**

*For credit card orders, call* **toll-free, 1-800-258-5473.** Or send your order on a separate piece of paper to: **Wayne Green Books, Retail Sales, Peterborough, NH 03458.** Be sure to include the book title, order number, and price. Postage and handling is $1.50 for the first book, $1.00 for each additional book. Foreign air mail is $10.00 per book. Check, money order, or complete credit card information must accompany order. If you have questions about your order, write customer service at the above address. Please allow 4–6 weeks for delivery. WGBooks available at your local bookstore. Dealer inquiries invited. Orders are payable in US dollars only.

# BOOK REVIEWS

Edited by Nancy Kipperman

## Controlling Financial Performance for Higher Profits

Dennis P. Curtin, Jeffrey R. Alves and Anne K. Briggs
Softcover, 170 pp., $15.50

## Planning and Budgeting For Higher Profits

Jeffrey R. Alves, Dennis P. Curtin and Anne K. Briggs
Softcover, 138 pp., $15.50

Both books published by:
Curtin & London/Van Nostrand Reinhold
6 Vernon St.
Somerville, MA 02145

For some reason, anyone who runs a business is automatically expected to understand things like cash flow and the acid test and inventory turnover rate. Unfortunately, many of us didn't quite make it to Harvard Business School so our business education has been through experience and the problems we've overcome. There's nothing wrong with the school of experience; the only thing is, tuition is rather high.

With both *Controlling Financial Performance* and *Planning and Budgeting*, you get a cost-effective way to cut your tuition bill with some good hard information on how to run your business. Both books are truly helpful. Oh, there's some work involved—you have to create VisiCalc templates to examine your own information and for some, you need a 64KB Apple (that gives you an idea of how lengthy the templates are).

Each book includes a chapter on the basics—what a disk is, how VisiCalc functions and so on. Each also focuses on the standard version of VisiCalc and the advanced version of the package (for the Apple III).

Both books include an order form for a $29.95 disk that contains all the templates they cover.

There's nothing wrong with the school of experience, but the tuition is rather high.

Since some are quite involved and take a lot of work, it's worthwhile to spend the extra cash and send away for the disks. They're not copy protected, so you can copy the original and make changes to fit your business on a duplicate.

### Controlling Financial Performance

Of the two books, I found *Controlling Financial Performance* the most help (although that may be because I've never been big on budgeting—the focus of the other book). It shows how to build an income statement and balance sheet and then advises you on how to customize both to your own operation.

Both financial statements are also loaded with "what if" cells, places that let you plug data into the program that will demonstrate what happens under different business circumstances.

I found Chapter 5 of *Controlling Financial Performance* to be the most helpful, as it covers a wide base of financial ratios. These tools allow you to compare one area of your business with its own past performance and with industry standards. As such, you're given an insight into your work that you simply can't gain in any other manner.

The coverage is good here. Liquidity ratios, which tell you if you can pay your bills, are explained. You also learn how to calculate and understand what your average collection period means. Since most businesses operate with a certain amount of inventory, the inventory turnover rate is examined and explained. The concept of safety/leverage ratios is outlined and focuses on debt to worth. Profitability ratios are covered, and you learn to examine profit in relationship to the assets your business controls.

All ratios are put into a VisiCalc worksheet, of course, along with appropriate "what if" questions, and they're also examined from different viewpoints. For instance, your banker looks at your current ratio differently than you do. He may insist that you maintain a minimum amount of net working capital or a minimum current ratio; from his viewpoint, the higher this ratio, the better. You, on the other hand, know that too high a current ratio may mean that your assets aren't out working for you, and so you have to reach a happy medium—a ratio that satisfies your banker, but is still low enough to make sure your cash is working to produce income for your business.

Helpful sources of financial ratios and other information are also listed, including how to make a comparison with similar businesses in your industry.

### Planning and Budgeting

The focus in *Planning and Budgeting* is on cash flow, that old nemesis of any business. As the authors note, "An unprofitable business with a solid cash flow and cash balance position is more likely to be around in five years than a profitable firm with a weak cash position." They start with an interesting concept: the cash wheel, a visual representation of what happens to cash inside your business.

Good advice includes how to construct a cash budget and where to find the information from your own work that you need to have. You're then taken step by step through a complete (and complex) cash forecasting model. Some cells, for example, require four recalculations of the worksheet. All the more reason, I

suppose, to spend a little extra to order the disks with the templates already created for you.

Even the balance sheet and income statement, which the book helps you create, emphasize cash flow and include advice on how often your business should look at these statements. All the accounting terms you run into are explained well.

Once the worksheets have been created and your data is entered, "...your fun begins." You learn how to manipulate data to examine various "what if" scenarios, all with an eye to learning more about how your business functions and how to produce more cash. A special analysis section suggests a number of "what if" questions for you to try, including "What happens if your cost of goods increase?" and "What if interest rates rise?"

Along with all this planning and budgeting advice comes this truism: "Too much planning can be counterproductive and take away from actually operating and running the business." To me, this indicates the authors have their feet firmly planted in the real world; there has to be a middle ground between planning and day-to-day operations, and the advice in the books bears that out.

Both books are filled with tip sections, brief comments on how to use VisiCalc most effectively, and how to operate your business more profitably.

Make no mistake about one thing: This sort of analysis is hard work, from worksheet creation to data entry. Part of this problem disappears if you purchase the disks with the templates already in place. A good troubleshooting section in each book also helps and gives specific advice on where to look if you have a problem.

In all, both *Controlling Financial Performance* and *Planning and Budgeting* are excellent books that give you more than your money's worth of sound business help.

**Gregory R. Glau**
**Prescott, AZ**

## Microcomputer Data Base Management

E.G. Brooner
Howard W. Sams & Co., Inc., 1982
4300 West 62nd St.
Indianapolis, IN 46268
Softcover, 158 pp., $12.95

A database may be loosely defined as any large collection of data. *Microcomputer Data Base Management* states that since personal and business records are a sort of library, the small computer is then the ideal tool to use as a librarian, or database manager. It is the stated aim of this book to clarify the general manipulative techniques used in managing data and to provide some practical examples from existing systems.

*Microcomputer Data Base Management* doesn't, however, reach its goals. A total of eight claims are made on the back cover of the book:

- Claim 1: "Enables you to tap the full potential of your microcomputer."

You'd be hard-pressed to find a *shelf* of books that would enable you to tap the full potential of your microcomputer. The microcomputer is a mind tool, just as a hammer is a hand tool. As long as the full potential of the human mind is unknown, the full potential of microcomputers will remain unknown.

- Claim 2: "Provides tutorial information on file handling, sorting, searching, linking and hashing."

Two sorting programs are presented. The first is the ubiquitous bubble sort. Bubble sorting is commonly the first (and usually the last) sorting technique taught in beginning programming classes. It's used as an easy-to-understand example of nested

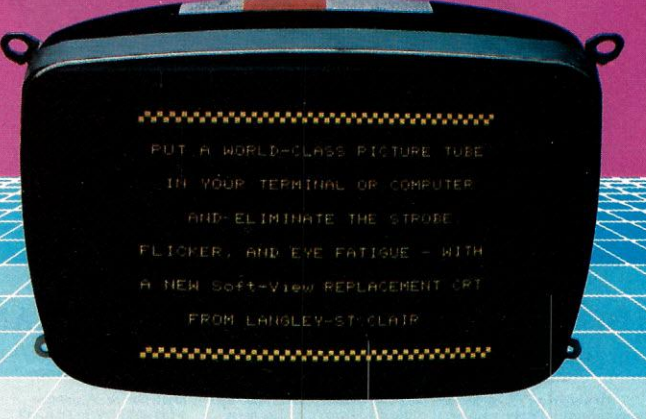
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loops, but it's perhaps one of the worst sorting techniques in use today. It's time we stopped teaching it. I've come across too many bubble sorts, especially by people who should know better.

The second sort is the shell sort, or Shell-Metzner Sort—a much better sort of sort. Regrettably, there's no flow chart for this program. If you want to see how it works, you must thread your way through the Basic listing.

A single paragraph is devoted to binary trees, a data structure that allows fast insertion and retrieval of information. According to the author, "...an ordered file, searched by a binary algorithm, is sometimes referred to as a *binary tree*." Yes, but not by people who know what a binary tree is.

●Claim 3: "Includes self-help test questions and exercises."

There's a total of 18, ranging from "Why are database techniques of interest?" to "Outline your own approach to keeping an accounts receivable database." No answers or solutions are given.

●Claim 4: "Reviews, explains, and evaluates three commercial databases, step-by-step."

Here they are: Whatsit for CP/M, North Star and Apple; Profile for TRS-80 Model I; and Selector for CP/M.

No commercial databases for the IBM PC are mentioned, other than dBase II, which is mentioned only in an appendix. The appendix, by the way, lists only vendors of software, not the manufacturers. (Curious.) The dBase II program has been on the Softsel Hot List for 76 weeks. Other best-selling database management programs not mentioned (all of which were on the Hot List during *all* of 1983) are pfs:File, DB Master and VisiFile.

VisiCalc is listed as database software. I always thought it was a spreadsheet program.

●Claim 5: "Stresses practical applications."

Only four applications receive more than one page of treatment: real estate appraisal, accounts receivable, job records and prescription records. I'm not sure they were either stressed or practical.

●Claim 6: "Presents an example of the simultaneous use of several data files, i.e., fixed assets, inventory, payroll and financial accounting."

The only examples I found that included simultaneous use of several data files were accounts payable and accounts receivable. "Inventory control" appears once in the book, in a list of "other uses for Profile." "Payroll" occurs twice, again only in lists of "other" applications. "Fixed assets" does not even appear in the index.

●Claim 7: "Gives you specific applications for Profile, such as job record function, accessing data from Basic and prescription record function."

These are the only three specific

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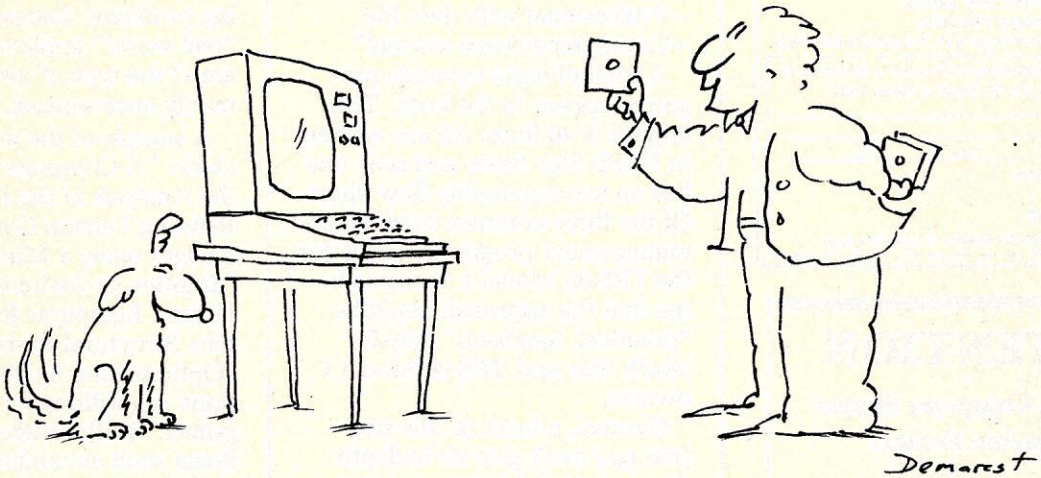
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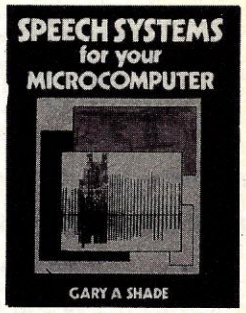
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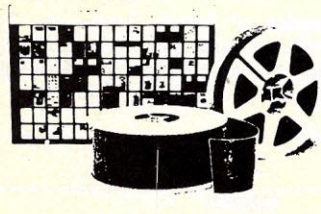
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# BOOK REVIEWS

applications of Profile that I found.

- Claim 8: "A practical, hands-on approach to data base management for the
—Microcomputer owner/user
—Manager
—Small-business owner/operator
—Scientist
—Professional with data file
—Computer-science student"

A total of eight example programs appear in the book. The longest is 40 lines. All are written in North Star Basic and only one has an accompanying flow chart. Of the three commercial database management programs, one is for the TRS-80 Model I. It seems to me that the approach could be "practical, hands-on" only for North Star and TRS-80 Model I owners.

Granted, a book of this size (158 pp.) can't give an in-depth discussion of database management, but why devote four pages to an ASCII table?

There are several good primers on database management, but *Microcomputer Data Base Management* isn't one of them.

**Philip M. Kreiker**
**Loveland, CO**

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## Software for Engineering Problems

Edited by Robert A. Adey
Gulf Publishing Co., 1983
Book Division
PO Box 2608
Houston, TX 77001
Softcover, 108 pp., $30.95

From the title, *Software for Engineering Problems*, I expected a collection of programs and subroutines useful to most engineers, technicians and advanced hobbyists in pursuit of their various design and evaluation exercises. I hoped for a collection of canned application programs that would solve a variety of common engineering problems over a broad range of engineering disciplines.

Instead, this book is a collection of articles originally published in the *International Journal of Advances in Engineering Software*. The majority of the articles are written by civil engineering and mathematics professors and industrial professionals from throughout the world. The articles are applicable to advanced problems in structural analysis, engineering mechanics and civil engineering. While the engineering problems discussed concern "real world" applications, they aren't the type of problems commonly encountered.

A sample of the article titles include: "A Computer Program for the Analysis of the Dynamic Bending-Torsion Coupling in Bridges using a Mini-Computer"; "Solution or Reduction of Equilibrium Equations for Large Complex Structural Systems"; and "Optimization of Matrix Solutions Algorithms for Microcomputers." With articles discussing items such as nonlinear curve fitting, simultaneous equation solutions, finite element analysis, and eigenvalue and eigenvector analysis, it's obvious that this isn't a book for the layman. While the articles are well-written, they follow the formal, third person style more appropriate for academic and technical journals than for an evening of casual reading.

However, if your interests and inclinations lean toward this field of study, the book provides, in the words of editor Robert Adey, "general articles on microcomputing software and theoretical developments which are useful for new applications of Computer Aided Engineering."

The articles emphasize the analysis of civil engineering and structural problems. The focus of the articles is on how a problem is defined and how an algorithm is developed to provide a solution. Consequently, the articles rely heavily on integral and differential calculus along with other advanced mathematical techniques to derive the algorithms. Less emphasis is given to the creation of the software or its use.

Most of the articles include program listings and sample output of example problems. Other

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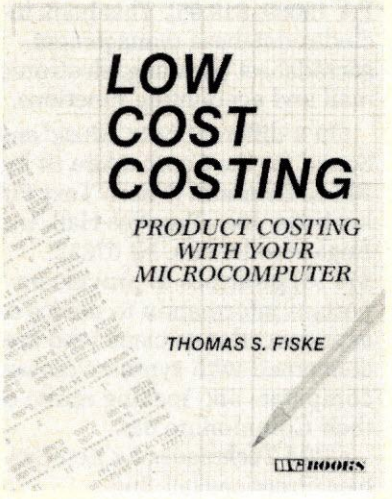
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articles indicate that the program listing is too lengthy to be included with the text. In these cases, a name and address is provided so you can purchase or otherwise obtain the listing.

The programs are written in various dialects of Fortran and Basic. While several articles promise system-to-system portability of the software, past experience shows that you shouldn't bet on it. With each article written by a different author using a different computer system, the chances of finding software in this book that runs directly on your system aren't very good. The computers for which the software was written include a variety of systems, ranging from minicomputers to desktop calculators.

In summary, if you're an academic or analytical civil or structural engineer, this book provides interesting, innovative and thought-provoking applications for computer aided design and analysis. If, on the other hand, you're looking for a source of ready-to-use, interactive, "canned" engineering applications software, this book is not an appropriate resource.

**Norbert E. Yankielun, P.E.**
**Westfield, NJ**

## From the MC Bookshelf

Rich man, poor man, beggar man, thief—aren't included in the list of occupations addressed by new books this month. If you're a dentist, physician, lawyer, accountant, insurance broker, engineer or businessman, however, there's something here for you.

A trio of books, published by John Wiley & Sons, Inc. (605 Third Ave., New York, NY 10158), are authored by Christina J. McClung, John A. Guerrieri and Kenneth A. McClung, Jr. These step-by-step guides are designed to address the needs of each profession in terms of microcomputers, suggest software and pinpoint exact applications. They are titled *Microcomputers for Insurance Professionals* ($14.95), *Microcomputers for Legal Professionals* ($14.95) and *Microcomputers for Investment Professionals* ($10.95).

*Computers for Professional Practice* by E.J. Neiburger, DDS, (Andent, Inc., 1000 North Ave., Waukegan, IL 60085-2997; $14.95) is an office guide for dentists, physicians, accountants, lawyers and people in business. It deals with "what will work for what price" and discusses both micro- and minicomputer applications in professional practice.

A book written as a guide and information source for business people with little computer experience is *Handbook of Computer Applications for the Small or Medium-Sized Business* by Howard Falk (Chilton Book Co., Radnor, PA 19089; $19.95). This book includes database management, spreadsheet planning, electronic mail and accounting functions.

On a different note, *Music and Sound for the Commodore 64* by Bill L. Behrendt (Micro Text Publications, Inc., Prentice-Hall, Inc., Englewood Cliffs, NJ 07632; $14.95) promises to provide important information to novice or experienced musicians who are concerned with synthesizers and computers and making music on their Commodore 64s.

*CP/M Techniques* by Ken Barbier (Prentice-Hall, Inc., Englewood Cliffs, NJ 07632; $19.95) is intended for experienced programmers with some background in writing assembly language programs under CP/M or other similar operating systems. The book presents three main topics: the structure of the CP/M operating system, guidelines on writing assembly language programs and details on how instructions link together to perform tasks within a program.

*Introducing the Apple Macintosh* by Edward S. Connolly and Philip Lieberman (Howard W. Sams & Co., Inc., 4300 W. 62nd St., Indianapolis, IN 46268; $12.95) claims to be "a non-computer book written about the most exciting computer yet created: the Apple Macintosh."

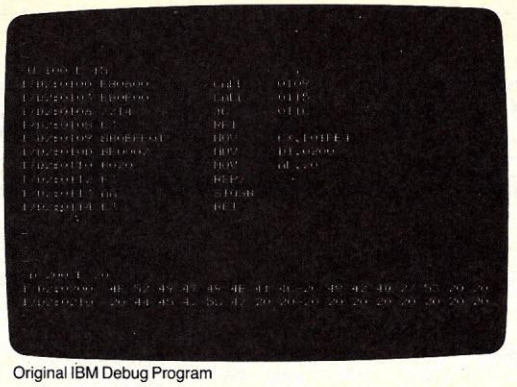
If you're an Apple II user, *Apple Basic Made Easy* by David A. and Marianne L. Gardner (Prentice-Hall, Inc., Englewood Cliffs, NJ 07632; $19.95) will teach you how to write Basic programs as you sit in front of your computer. It is geared to the first- or second-time computer user, an elementary school teacher with no computer experience or a parent teaching a child to program on a home computer.

*The Media Specialist, the Microcomputer, and the Curriculum* by Joanne Troutner (Libraries Unlimited, Inc., PO Box 263, Littleton, CO 80160; $19.50) describes the role of the media specialist in designing computer literacy programs for teachers and students in grades K–12.

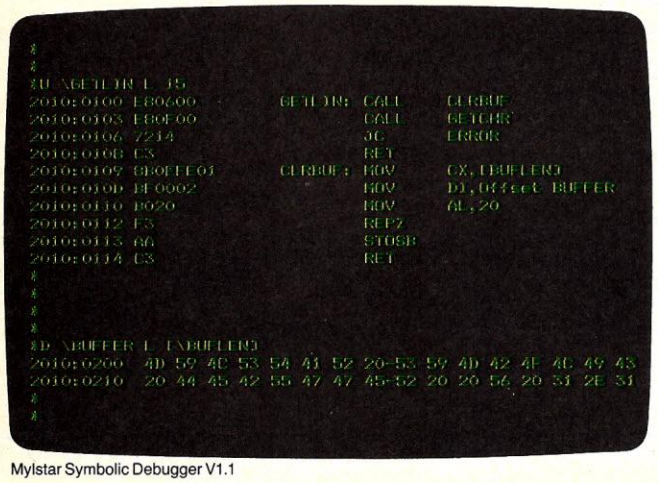
Practice Management Associates, Ltd. (126 Harvard St., Brookline, MA 02146) has released *Design Compudata '84*, a six directory set of software, turnkey systems and services for design firms. The set of six volumes may be purchased for $125 or bought separately at $25 each. Included in the set are:

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☐ Kaypro Double Density (NCR)
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☐ North Star Single Density
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# CALENDAR

## June 1–3
## Stratham, NH

The first annual **Computer Country Fair and Exposition** will be held June 1–3 in Stratham, NH. The fair, which is sponsored by the Exeter Area Chamber of Commerce, will feature software and hardware for everything from games to sophisticated business applications.

Refreshments will be available at the fair; activities for all ages are planned. The fair will be on the campus of the New Hampshire Voc-Tech College. For more information, telephone Julianne Cooper at 603-778-0344.

## June 2
## Thousand Oaks, CA

The California Lutheran College will host a **Computer Fair** Saturday, June 2. In conjunction with the fair, the College is sponsoring a software contest open to both students and adults. Entries will be accepted in two categories: Division I is for original software and Division II is for most creative use of off-the-shelf software.

Representatives from well-known software houses will be on hand to judge entries. For more information, contact the Office of Continuing Education, California Lutheran College, 60 W. Olsen Road, Thousand Oaks, CA 91360; 805-492-2411, extension 490.

## June 2–3
## Schaumburg, IL

The second annual **Computer Hyattfest Weekend**, to be held at the Hyatt Regency Woodfield, will feature hands-on computer instruction, fear-of-computer group therapy sessions, speakers, workshops and a free arcade, courtesy of Bally/Midway. For more information, telephone Edie Tracer at 312-467-7142 or Jane Kaplan at 312-835-4990.

## June 4–8
## Philadelphia, PA

The 13th annual **Conference of the Mumps User's Group** will be at the Adam's Mark Hotel. Presentations, tutorials, workshops and roundtable discussions will all focus on the Mumps computer language.

Special introductory seminars will also be offered for Mumps neophytes. Hardware, software and systems exhibitors will also present demonstrations.

Registration fees include a one-year membership to the Mumps user's group. For more details, telephone 310-779-6555 or write the Conference Department, Mumps User's Group, 4321 Hartwick Road, Suite 308, College Park, MD 20740.

## June 5–9
## Rochester, NY

The Institute for Applied Forth Research will host the **1984 Rochester Forth Applications Conference** on the University of Rochester campus. The conference is geared toward both experienced and first-time users of Forth.

Speakers will discuss real-time systems, and papers on Forth applications and techniques will be presented. For more information, contact Diane Ranocchia, conference coordinator, Institute for Applied Forth Research, Inc., 70 Elmwood Ave., Rochester, NY 14611; 716-235-0168.

## June 8–10
## Wichita, KS

The **1984 Kansas Computer Exhibition and Robotics Conference**, billed as the largest annual computer event in Kansas, will be at the Century II Convention Center in Wichita. The conference will feature speakers, demonstrations, audiovisual presentations and exhibitions covering personal, aerospace and agricultural applications of robotics.

For more information, contact Ron Holmes, show coordinator, Wichita Group, Inc., PO Box 47186, Wichita, KS 67201; 316-269-1022.

## June 9 and 10
## San Mateo, CA

**The Computer Supermarket**, a personal computer show geared toward people interested in purchasing software and computer equipment, will be at the San Mateo County Fairgrounds the weekend of June 9 and 10.

Merchandise will be available for business, education, entertainment and home computer use. For more information, telephone or write Microshows, PO Box 4323, Foster City, CA 94404; 415-571-8041.

## June 12–14
## Chicago, IL

**Info/Software**, billed as an information management exposition and conference for software, is slated for June 12–14 at McCormick Place in Chicago. The show is dedicated to demonstrations of applications and systems software for all sizes of computers.

New to the show this year is a computerized software information center that will provide show attendees with comprehensive information on each exhibitor.

More information is available from Clapp & Poliak, 708 Third Ave., New York, NY 10017; 212-370-1100.

# CALENDAR

## June 14–16
## Philadelphia, PA
## June 28–30
## Chicago, IL

The **HITEC '84 Educational Computer Conference** is scheduled to take place on June 14–16 at the Hyatt Regency in Philadelphia and on June 28–30 at the Bismark Hotel in Chicago. The conference will feature exhibits, demonstrations, seminars and a public-domain software exchange.

The conference is sponsored by the National Educational Computer Library and this year's themes will be Computers and Computer Languages in Education for the Philadelphia show and Higher Instructional Techniques in Education for the Chicago show. For more information, contact NECOL, PO Box 792, Torrington, CT 06790; 203-489-2728.

## June 15–17
## Dayton, OH

The ninth annual **Midwest Affiliation of Computer Clubs Computerfest** is slated for June 15–17 at the Dayton Convention Center. The show will feature a computer and electronic flea market and offer a host of seminars and minicourses.

Languages, operating systems, robotics and a plethora of other topics will be addressed. For more information, write to Computerfest '84, PO Box 24505, Dayton, OH 45424; 513-426-4927.

## June 17–20
## Bowling Green, KY

The seventeenth annual **ASCUE Conference** (Association for Small Computer Users in Education) is scheduled for June 17–20 on the campus of Western Kentucky University at Bowling Green.

The conference will focus on a number of topics, including academic computing, computer applications in libraries and control of institutional word processing.

A tour of the General Motors Corvette plant is also scheduled to allow conference participants to see industrial robots in action.

For further information, contact Dr. Dudley Bryant at Western Kentucky University, Bowling Green, KY 42101; 502-745-0111.

## June 18–20
## Norcross, GA

The Institute of Industrial Engineers (IIE) wraps up its spring series of conferences and seminars with **Robotics—Equipment, Applications and Methodology**, which will be at the IIE Education Center in Norcross, GA.

For registration information, contact the IIE Conference Department, 25 Technology Park/Atlanta, Norcross, GA 30092; 404-449-0460.

## June 19–22
## Hong Kong

The second annual International Exhibition and Conference on Business and Personal Computers—**Percom '84**—will be held at the Jade Ballroom in the Hotel Furama, Hong Kong.

Exhibits will include mini- and microcomputers, hardware, software and peripherals. The show is designed primarily with trade and education professionals from around the world in mind.

For more information, contact Asdale Exhibition Services, 20/F Tung Sun Commercial Center, 194–200 Lockhart Road, Wanchai, Hong Kong; telex 63109 ADSAP HX.

## June 20–21
## Denver, CO

The College for Financial Planning in Denver, CO, will present a **Computer Seminar and Information Exchange** June 20–21. The seminar, which will focus on software for the financial industry, will offer sessions on computer literacy and the future of computer systems. Several noted speakers will lead seminars.

The information exchange will allow participants to discuss hardware and software developments with industry representatives.

For further information, contact the Continuing Education Department at the College for Financial Planning, 9725 E. Hampden Ave., Denver, CO 80231; 303-755-7501.

## June 21–23
## Jacksonville, FL

The second installment of this year's **Great Southern Computer Shows** is scheduled to be at the Veterans Memorial Coliseum in Jacksonville, FL. The shows feature exhibits on a wide variety of computer-related products and services, including hardware, software, data processing, telecommunications, consulting services and timesharing.

For more information, contact the Great Southern Computer Shows, PO Box 655, Jacksonville, FL 32201; 904-356-1044.

## June 26–28
## San Francisco, CA

The first National Conference on Computers in Dental Practices, **Dentcom**, will be at the California Masonic Memorial Temple, Nob Hill, San Francisco. The conference will include 20 educational seminars and feature a unique, for-doctors-only investment planning seminar at the Old San Francisco Mint.

The conference is designed specifically for professionals interested in dental practice management computing. For more information, telephone 800-445-2121 from within California or 800-468-2211 from elsewhere.

# CALENDAR

### June 26–28
### New York, NY

The New York Coliseum is the site of this year's **PCExpo**, dedicated exclusively to the IBM PC market. Exhibitors will include original software producers and principal service vendors.

For more information, contact PCExpo, 333 Sylvan Ave., Englewood Cliffs, NJ 07632; 210-569-8542.

### June 26–29
### Rome, Italy

The **Second World Conference on Transborder Data Flow Policies**, organized by the Intergovernmental Bureau for Informatics, will convene in Rome June 26–29.

The conference will further cover topics addressed at the first World Conference concerning international data flow with respect to developing countries. The conference will also cover the adoption of universal principles concerning transborder data flow.

Persons wishing to participate should contact the Intergovernmental Bureau for Informatics, Department of Policies, PO Box 10253, 00144 Rome, Italy.

### June 26–28
### Washington, DC

The first **Government Computer Expo 84** will address what is billed as the newest segment of the government computer market—data users. The conference will be at the Sheraton Washington Hotel.

The conference will offer three days of seminars as well as an exhibit featuring more than 200 participants. For more information, contact the U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, MD 20903; 301-445-4405.

### June 28–30
### Vail, CO

The Ohio State University College of Medicine and the American Society of Computers in Medicine are cosponsoring the **American Society of Computers in Medicine and Dentistry Conference**, which will be at The Lodge in Vail, CO. The conference will discuss ways computers can fit into personal and professional life.

AMA credit, category I, is available for the conference. For more information, contact Arlene Rogers, ASCMD, PO Box 21483, Upper Arlington, OH 43221; 614-421-8487.

# CLUB NOTES

## Ohio Hotline

The Greater Cincinnati IBM PC User's Group meets every third Tuesday at Cincinnati Technical College, Central Parkway, from 7 to 9:30 p.m. The group offers a monthly newsletter, a disk library and hotlines. Guest speakers are featured at monthly meetings and special interest groups for club members have been established. For further information, contact Keith Betscher, PO Box 3097, Cincinnati, OH 45201.

## Colorado DACS

The Denver Amateur Computer Society, DACS, meets on the third Wednesday of each month at 7 p.m. A monthly newsletter called Interrupt gives members information on many Colorado computer clubs. For additional information, contact the Denver Amateur Computer Society, PO Box 477, Wheatridge, CO 80034.

## Valley IBM PC Group

The San Fernando Valley IBM PC Users Group meets on the first Tuesday of the month at 7:30 p.m. at the Progressive Savings Bank Building, Woodland Hills, CA. Annual dues are $25 and members number more than 300. For more information, contact David Nussbaum, 11558 Riverside Drive, North Hollywood, CA 91602; 213-985-8337.

## Epson Connection

The EpsonConnection, an international Epson computer user's group, has approximately 4000 members. Membership includes access to a RBBS network throughout the country and a comprehensive 32-page monthly publication. Fee is $24 per year. For further information, contact The EpsonConnection, PO Box 14027, Detroit, MI 48214.

## IN Users Group

The I.B.M.P.C. Users Group meets the fourth Monday of each month at Indiana Central University, Lilly Hall, Room 206, Indianapolis, IN, at 7 p.m. Members receive a new member packet and membership card and the monthly newsletter for annual dues of $15 (single) and $20 (family). For additional information, write I.B.M.P.C. Users Group, Inc., PO Box 68271, Indianapolis, IN 46268.

## C-Pro Shares Info

C-Pro, a national user's group for owners of CompuPro microcomputer systems, has formed to share technical information, solutions and special purpose application information.

A charter membership in C-Pro is $10. There are approximately 350 members presently. For more information, contact William C. Hess, 14075 Jefferson Davis Highway, Woodbridge, VA 22191; 703-690-3312.

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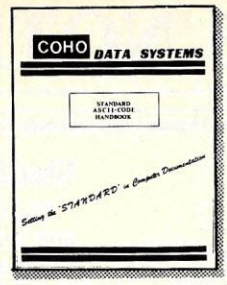
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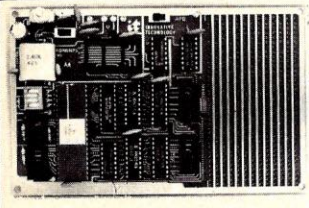
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The APB is an excellent **educational aid** which allows for evaluation and familiarization of 6801 family members . . . It is great for **prototype development.** Since the "nuts and bolts" are already in place, the designer need only add the necessary interface circuits for a particular application . . . It can also be used as a simple cost-effective **dedicated controller** for those limited quantity applications.

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| APB-3 Above with MC6801G1 and LILbug manual | $109 |
| APB-4 Above with four 2114L RAMs | $129 |

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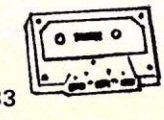
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# NEWS WINDOW

By Eric Grevstad
Senior Writer

Commodore, terror of the home computer market, may be moving into PC territory: After signing a technology licensing agreement with Canada's Bytec (makers of the Hyperion MS DOS transportable), the low-end leader has obtained Intel's permission to take 8088 microprocessors. (The leading 8088 customer, IBM, is reportedly considering the same step.)

While rival home micro vendors must stand in line at the CPU store, Commodore's secure, in-house chip supply has made up for its revolving-door management. The firm's two MOS Technologies plants produce five million chips a month; dropping some readily available ROM chips in favor of 8088s might give a Commodore PC an edge on its 60 IBM-compatible competitors.

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If Commodore can make its own chips, Kaypro can make its own disk drives. The Solana Beach, CA, suitcase firm has obtained manufacturing rights to the Drivetec 320, a 5¼-inch drive offering 2.6 megabytes of formatted storage.

Who uses portables? NEC surveyed 750 buyers of its PC-8201 notebook computer and found that 29 percent were salespeople and 23 percent data processing workers, with other groups splitting the rest (students, for instance, accounted for three percent).

The PC-8201 is, of course, a TRS-80 Model 100 with different arrow keys and no modem. In March, responding to a Radio Shack sale, NEC bundled its $799 unit with a free 300-baud, direct-connect modem and an upgrade to 24KB RAM.

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Dr. Bob Keston, president of the Management Training Institute of Rockville, MD, has given computer shoppers a "numeric indicator of 'bang-for-the-buck.'" Keston's "price-performance indicator" compares today's micros to a $2000 "standard system" (eight-bit processor, 64KB RAM, 256KB disk storage), assigning extra points for more memory, fewer for smaller screens and so forth.

With total score divided by price, the imaginary micro rates exactly one point—beating the Apple IIe (0.96), but trailing the TRS-80 Model 4 (1.03), IBM PC (1.13) and Apple Macintosh (1.6).

The loser? The Grid Compass, sunk by its $8150 price to a lowly 0.43 value rating (it's since been cut to $6795). The winners? The $2795 Kaypro 10 scored 2.71 points and the obscure Starlite HD-20 ($4495) scored 2.9; they're plain Z80 CP/M systems, but pack ten and 20 megabyte hard disks, respectively.

And the best value of all? IBM's 64KB, cassette-based PCjr ($669), which rated an astounding 3.1 points. No offense, but in this case News Window thinks Keston's fingers must have slipped. Easy to do on a PCjr keyboard.

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Five years after yielding marketing rights to their spreadsheet, VisiCalc's natural parents have sued to regain custody from its adoptive ones. Software Arts of Wellesley, MA, claims that VisiCorp has violated the two firms' 1979 agreement by not marketing VisiCalc aggressively (the final straw seems to have been VisiCorp's urging owners to trade in their VisiCalc disks for credit toward the San Jose, CA, company's own VisiOn Calc).

VisiCorp, for its part, claims that Software Arts failed to provide program upgrades, leaving VisiCalc at a disadvantage compared to newer spreadsheets like Multiplan and SuperCalc3. At any rate, Software Arts has terminated the old agreement and plans to sell VisiCalc Advanced Version under its own label. VisiCorp, which has spent five years swooping down on patch or enhancement authors who try to use the prefix "Visi-", will fight that every step of the way.

VisiCorp is quietly awaiting the court decision; Software Arts is staging a media blitz, with press releases headlined "Software Wars" and defiance even in legal disclaimers—"VisiCalc is, as of this writing, a registered trademark of VisiCorp." The computer press has jumped on the story; at the moment, it's either this or boring articles about college students selling their Macintoshes on the black market.

What's at stake? VisiCalc isn't a current bestseller like 1-2-3, but neither are the rivals' more recent programs, TK!Solver and VisiOn respectively. Both Software Arts and VisiCorp are fighting against reputations as one-product companies, but for now, they're fighting over their one product.□

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*If you think you saw a lot of Charlie Chaplin last year, you're right: According to the Television Bureau of Advertising, IBM was 1983's top tv buyer among micro manufacturers. Apple finished a modest seventh, but that was based on a few IIe commercials; this year's "1984" and Macintosh campaigns should change that.*

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